TEK INSTRUCTION MANUAL

Part No. 070-2200-01
Product Group 20

1450 (B000100-B010379)
1450-1 (B010380 & up)
TELEVISION DEMODULATOR

NOTE

At serial number B010379 the name of the instrument changed from 1450 to 1450-1. This manual refers to the 1450-1, but equally applies to the 1450.

Please Check for CHANGE INFORMATION at the Rear of This Manual

First Printing JUL 1979
REV JUN 1984

Tektronix®
COMMITTED TO EXCELLENCE

PREFACE

This manual documents the TEKTRONIX 1450-1 Television Demodulator. The 1450-1 uses a plug-in down converter for channel selection. The appropriate down converter instruction manual should also be consulted for information about using the 1450-1 and down converter as a system.

This Preface describes the contents of the manual, with a brief description of each section within the manual.

The Table of Contents is a detailed list of all important pieces of information and their location in the manual. Lists of Illustrations and Tables follow the Table of Contents.

Operators Safety and Servicing Safety Summaries give general safety information about the instrument.

The manual is split into two parts, Operator's Information and Servicing Information. All pertinent information regarding the operation of the instrument is located in the Operator's part. This will be of use to both the operator and the service technician. The Servicing part contains that information necessary to effectively service the instrument. This information should be useful only to qualified service technicians.

The Operator's part includes Sections 1 and 2:

Section 1 (Introduction and Specification) includes a general description of the instrument, a safety summary, and the specification.

Section 2 (Operating Instructions) includes information on installation, controls and connectors, and operator familiarization.

PREFACE (cont)

The Servicing part contains Sections 3 through 9:

Section 3 (Theory of Operation) begins with a general overview of the instrument, followed by a detailed circuit description.

Section 4 (Calibration) includes a Performance Check and an Adjustment Procedure, and an equipment list.

Section 5 (Maintenance) covers the standard electrical and mechanical maintenance; plus any special tools, unusual components, and special handling.

Section 6 (Options) documents any options available with the instrument.

Section 7 (Replaceable Electrical Parts) includes ordering information and part numbers for all replaceable electrical parts.

Section 8 (Diagrams) includes a block diagram, schematics, circuit board illustrations, component basing diagrams, waveforms, parts locating charts, and adjustment location illustrations.

Section 9 (Replaceable Mechanical Parts) refers to an exploded view drawing of the instrument, and lists ordering information for all replaceable mechanical parts.

Change and correction information after the manual has been printed is located behind a tabbed page at the rear of the manual.

The text and diagrams are in accord with, and based on, the following standards of the American National Standards Institute, Inc. (ANSI):

ANSI Y1.1 — 1972, Abbreviations

ANSI Y32.2 — 1975, Graphic Symbols

ANSI Y32.14 — 1973, Graphic Symbols (Logic)

ANSI Y32.16 — 1975, Reference Designators

TABLE OF CONTENTS

TABLE OF CONTENTS (cont)

WARNING

THE FOLLOWING SERVICING INSTRUCTIONS ARE FOR USE BY QUALIFIED PERSONNEL ONLY. TO AVOID PERSONAL INJURY, DO NOT PERFORM ANY SERVICING OTHER THAN THAT CONTAINED IN OPERATING INSTRUCTIONS UNLESS YOU ARE QUALIFIED TO DO SO.

PART II — SERVICING INFORMATION

TABLE OF CONTENTS (cont)

TABLE OF CONTENTS (cont)

TABLE OF CONTENTS (cont)

TABLE OF CONTENTS (cont)

TABLE OF CONTENTS (cont)

TABLE OF CONTENTS (cont)

LIST OF ILLUSTRATIONS

LIST OF ILLUSTRATIONS (cont)

LIST OF ILLUSTRATIONS (cont)

LIST OF ILLUSTRATIONS (cont)

LIST OF TABLES

OPERATOR'S SAFETY SUMMARY

The general safety information in this part of the summary is for both operating and servicing personnel. Specific warnings and cautions will be found throughout the manual where they apply, but may not appear in this summary.

TERMS

In This Manual

CAUTION statements identify conditions or practices that could result in damage to the equipment or other property.

WARNING statements identify conditions or practices that could result in personal injury or loss of life.

As Marked on Equipment

CAUTION indicates a personal injury hazard not immediately accessible as one reads the marking, or a hazard to property including the equipment itself.

DANGER indicates a personal injury hazard immediately accessible as one reads the marking.

SAFETY CONSIDERATIONS

Power Source

This product is intended to operate from a power source that will not apply more than 250 volts rms between the supply conductors or between either supply conductor and ground. A protective ground connection by way of the grounding conductor in the power cord is essential for safe operation.

Grounding the Product

This product is grounded through the grounding conductor of the power cord. To avoid electrical shock, plug the power cord into a properly wired receptacle before connecting to the product input or output terminals. A protective ground connection by way of the grounding conductor in the power cord is essential for safe operation.

Use the Proper Power Cord

Use only the power cord and connector specified for your product.

Use only a power cord that is in good condition.

Refer cord and connector changes to qualified service personnel.

Use the Proper Fuse

To avoid fire hazard, use only the fuse of correct type, voltage rating and current rating as specified in the part list for your product.

Refer fuse replacement to qualified service personnel.

Do Not Operate in Explosive Atmospheres

To avoid explosion, do not operate this product in an explosive atmosphere unless it has been specifically certified for such operation.

Do Not Remove Covers or Panels

To avoid personal injury, do not remove the product covers or panels. Do not operate the product without the covers and panels properly installed.

SERVICING SAFETY SUMMARY

FOR QUALIFIED SERVICE PERSONNEL ONLY

Refer also to the preceding Operators Safety Summary.

Do Not Service Alone

Do not perform internal service or adjustment of this product unless another person capable of rendering first aid and resuscitation is present.

Use Care When Servicing With Power On

Dangerous voltages exist at several points in this product. To avoid personal injury, do not touch exposed connections and components while power is on.

Disconnect power before removing protective panels, soldering, or replacing components.

Power Source

This product is intended to operate from a power source that will not apply more than 250 volts rms between the supply conductors or between either supply conductor and ground. A protective ground connection by way of the grounding conductor in the power cord is essential for safe operation.

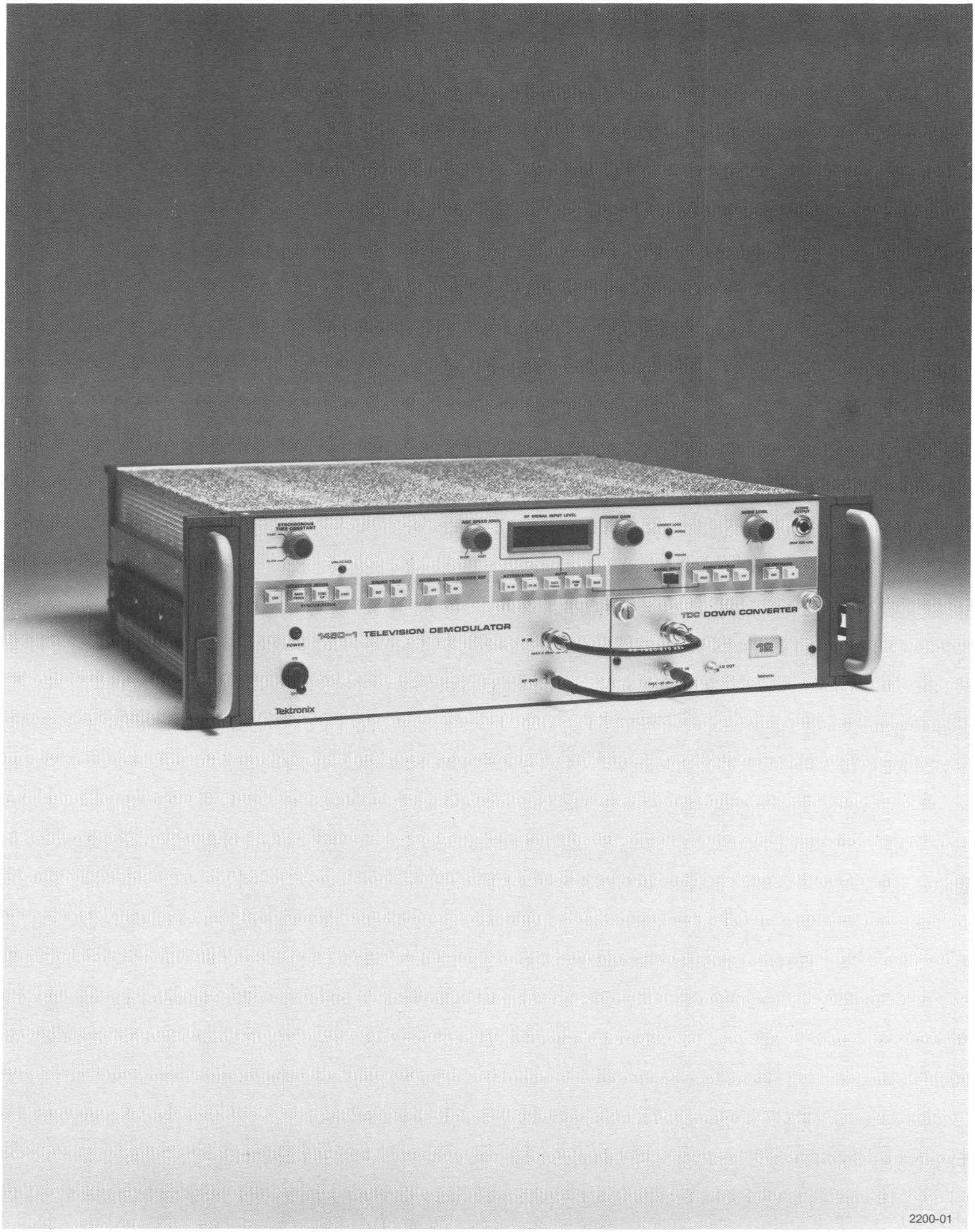


Fig. 1-1. 1450-1 Television Demodulator.

@

INTRODUCTION AND SPECIFICATION

INTRODUCTION

The 1450-1 is a high-quality television demodulator. The RF section is easily interchangeable and can be ordered for any channel. The IF section uses Surface Acoustic Wave (SAW) filters for a precise Nyquist slope and exceptional stability. This stability means that very little maintenance or recalibration is required.

Both synchronous and envelope detection is used in the 1450-1. The synchronous-detection mode eliminates quadrature distortion so that the transmitter output can be compared with the video input signal. The envelope-detection mode is used in conjunction with synchronous detection to assess how a home receiver is affected by certain transmitter distortions. A quadrature output from the synchronous detector is provided for measuring transmitter incidental phase. When used with the video output, a vector display of the RF signal can be produced on an XY monitor or a 1480 Waveform Monitor with an external phase graticule.

The 1450-1 has a high dynamic-range, allowing a low-sensitivity input for a signal directly out of a transmitter, and a high sensitivity for a distant signal. An LED readout indicates the input power level in dBm.

Visual and Aural Carrier Loss alarm lights are included on the front panel. These LEDs light with a loss of either carrier. A set of relay contacts is available at the rear-panel REMOTE connector to drive an external alarm circuit. The relay switches when either of the alarm lights activate, and when instrument power is lost.

Both Split Carrier and Intercarrier sound detection methods are included in the 1450-1. Split Carrier is used to accurately measure the aural transmitter. The Intercarrier mode is used to help determine the effects of picture carrier FM noise on the sound signal.

The audio section has three audio outputs and a calibrated-deviation output voltage. These outputs are used for monitoring and measuring parameters of the aural transmitter.

A zero-carrier reference pulse is generated internally, or the 1450-1 can be driven by an external source (i.e., a TEKTRONIX 1440). This pulse establishes a reference for measuring modulation depth.

SPECIFICATION

Table 1-1

ELECTRICAL CHARACTERISTICS

Characteristics	Performance Requirement	Supplemental Information
System		
RF Attenuator Range	30 dB in 10 dB steps.	System specification are for the 1450-1 with a TDC Down Converter. Calibration procedures for these specifications are located in the down converter manual. Input level range shifts with attenuation: −59 dBm to +7 dBm with 10 dB attenuation; −49 dBm to +17 dBm with 20 dB attenuation; −39 dBm to +27 dBm with 30 dB attenuation.
Noise Figure		
VHF	10 dB or less.	
UHF	11 dB or less.	

Table 1-1 (cont)

Characteristics	Performance Requirement	Supplemental Information
AGC Range	66 dB.	
Adjacent Channel Cross-modulation	60 dB or greater down.	Adjacent channel signal less than or equal to the desired channel signal.
2nd Adjacent Channel Cross-modulation	60 dB or greater down.	2nd adjacent channel signal less than or equal to the desired channel signal.
Amplitude vs. Sideband Frequency Response	See Fig. 1-2.	
Envelope Delay vs. Sideband Frequency Response	See Fig. 1-3.	
Amplitude vs. Baseband Frequency Response	See Fig. 1-4.	
Variation in System Frequency Response with AGC		
VHF	±0.1 dB or less.	
UHF	±0.15 dB or less.	
Chrominance/Aural Carrier/Visual Carrier Intermodulation	50 dB or greater down.	3-tone test. p-p video/p-p 920 kHz.
Readout Accuracy	±1 dB.	
Readout Resolution	±0.1 dB.	
Mainframe		
RF INput Connector		50 Ω N (rear panel).
RF OUTput Connector		50 Ω SMA (front panel).
IF INput		From 50 Ω source.
Z_{in} and Connector		50 Ω bnc (front panel).
Return Loss	18 dB or greater (Over IF passband).	At least 26 dB with 6 dB or greater pad.
Level Range	−20 dBm to −64 dBm.	Signal-to-noise ratio deteriorates as signal decreases.
Frequency		
Visual IF		
Option 1	37.0 MHz ±120 kHz.	
Option 2	38.9 MHz ±120 kHz.	
Option 3	45.75 MHz ±120 kHz.	
Aural IF		4.5 MHz below the visual IF.

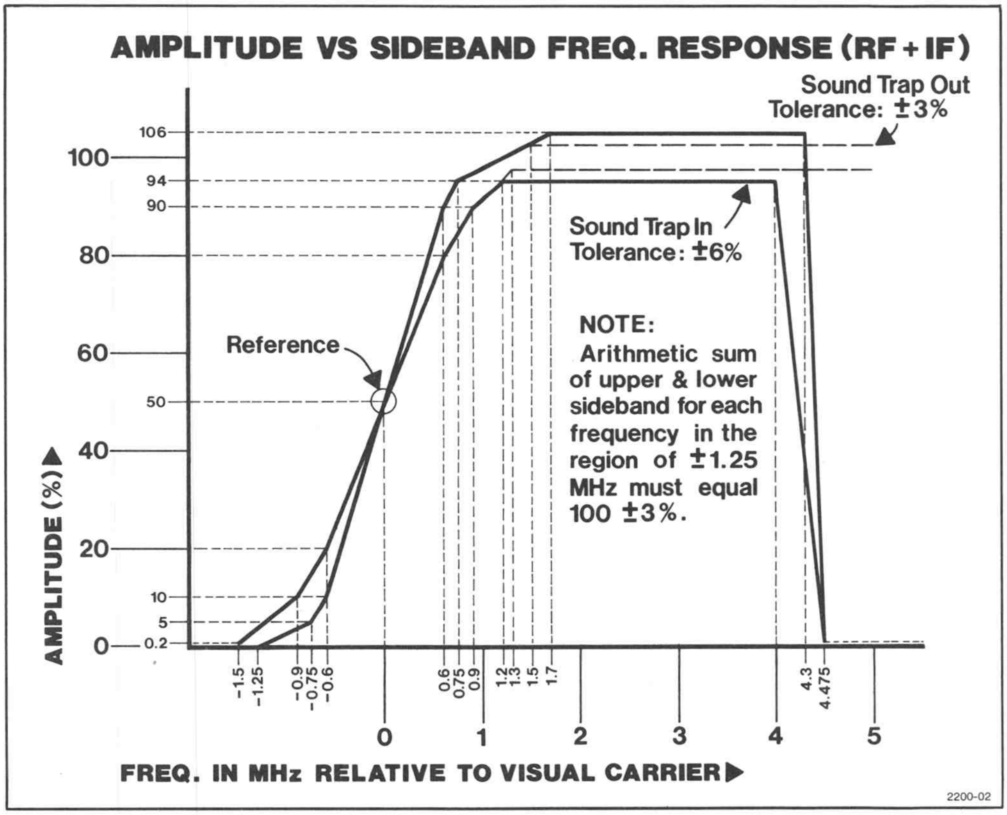
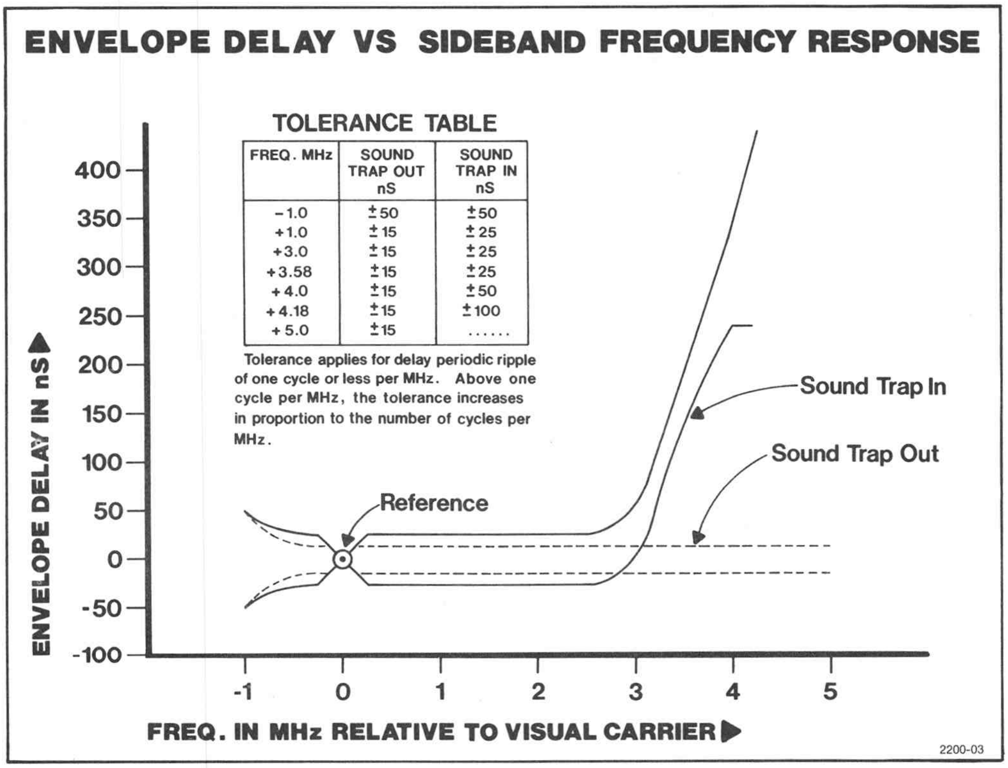


Fig. 1-2. Amplitude vs. Sideband Frequency Response (RF + IF).



FREQ. MHz	SOUND TRAP OUT nS	SOUND TRAP IN nS
−1.0	±50	±50
+1.0	±15	±25
+3.0	±15	±25
+3.58	±15	±25
+4.0	±15	±50
+4.18	±15	±100
+5.0	±15	......

Fig. 1-3. Envelope Delay vs. Sideband Frequency Response.

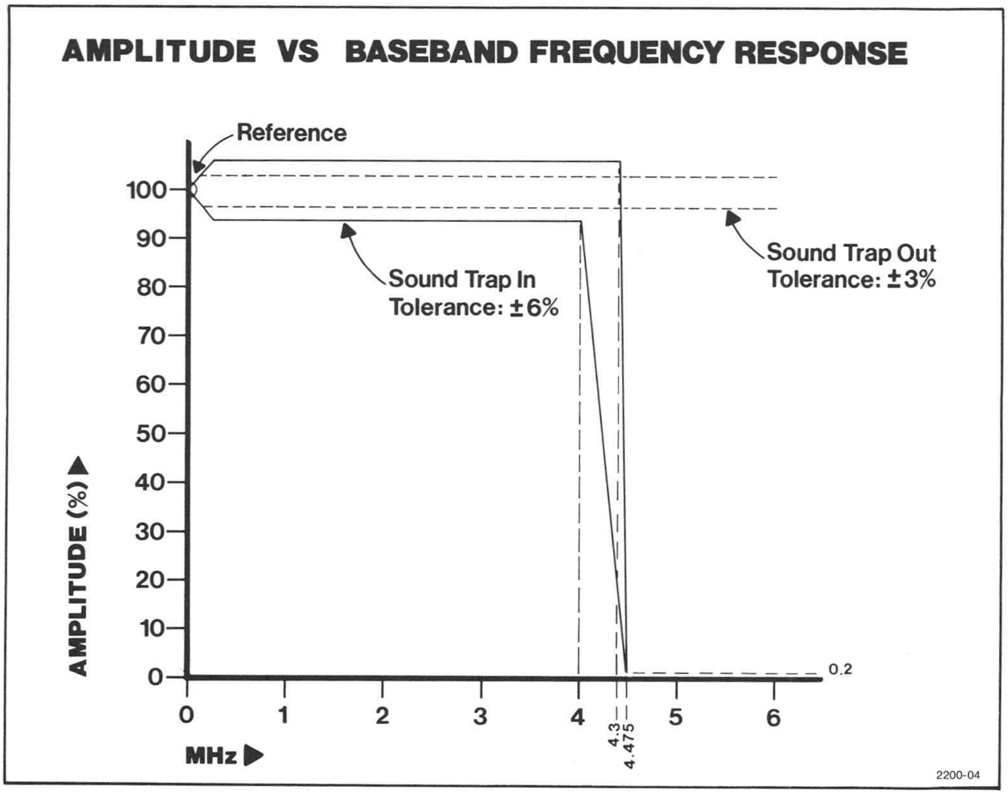


Fig. 1-4. Amplitude vs. Baseband Frequency Response.

Table 1-1 (cont)

Characteristics	Performance Requirements	Supplemental Information
Variation in Mainframe Frequency Response as a Function of AGC	±0.05 dB or less.	
VIDEO OUTPUT		
Z_0 and Connector		75 Ω bnc (2 rear-panel outputs).
Return Loss	34 dB or greater from 0 to 6 MHz.	
Video Level		1 V p-p ±2% (Sync-tip) to peak white at standard modulation percentages).
DC Level		
Blanking Level	0 V ±50 mV.	In back-porch agc.
Sync Tip	Blanking level—286 mV ±5.7 mV.	In sync-tip agc with blanking level measured in back-porch agc.
Levels Relative to Zero Carrier		
Blanking Level	Zero Carrier—857 mV ±17 mV.	In back-porch agc.
Sync Tip	Zero Carrier—1143 mV ±22 mV.	In sync-tip agc.

Table 1-1 (cont)

Characteristics	Performance Requirement	Supplemental Information
Linear Distortions		
Short Time	0.5% 'k' or less.	
Line Time		
Wideband Synchronous	0.5% 'k' or less.	
All Other Modes	1% 'k' or less.	
K_{pb}	0.5% 'k' or less.	
K_{2t}	0.5% 'k' or less.	
Field Time	0.5% 'k' or less.	
Chrominance-to-Luminance Delay	±20 ns or less.	
Non-Linear Distortions		
Line Time Non-Linearity	1% or less.	
Differential Gain		
Synchronous	1% or less.	
Envelope	4% or less.	
Differential Phase	1° or less.	
Aural Signal Rejection	46 dB or greater.	4.5 MHz p-p/blanking-to-reference white picture signal (100 IRE).
Video Signal to Noise Ratios		
Low Frequency	60 dB or greater.	p-p video/p-p mains ripple.
Mid-Frequency Coherent	50 dB or greater.	p-p video/p-p noise.
White Noise	60 dB or greater with at least −25 dBm of input signal.	p-p video/rms white noise (10 kHz to 5 MHz). (Decreases with input signal. See Fig. 1-5.)
QUATRATURE OUTput		
Z_O and Connector		75 Ω bnc (rear panel).
Return Loss	34 dB or greater from 0 to 6 MHz.	
Quadrature Phase with Respect to Video Out	90° ±2°.	
Synchronous Detection Phase Angle	±3°.	

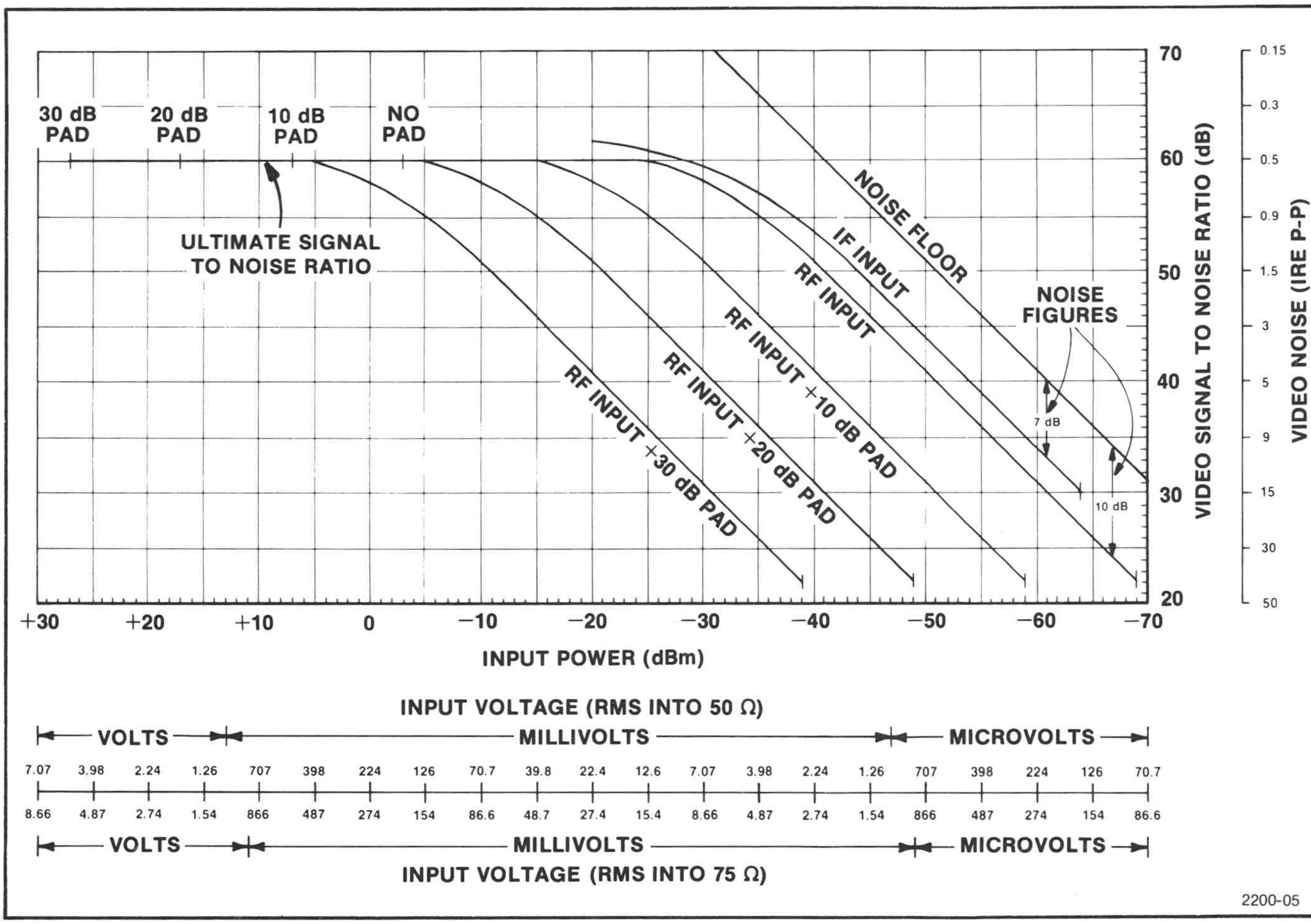
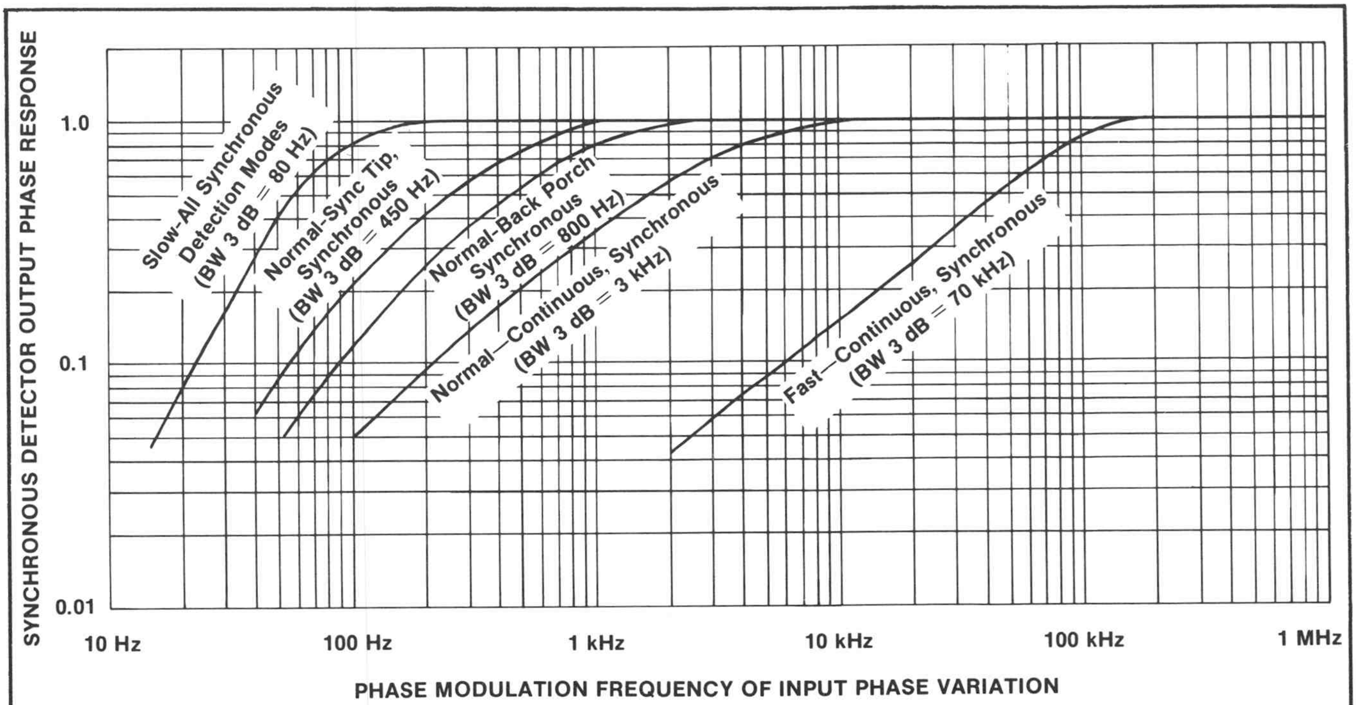


Fig. 1-5. Video Signal to Noise Ratio vs. Input Signal Level.

Table 1-1 (cont)

Characteristics	Performance Requirements	Supplemental Information
Low-Frequency Phase Noise	0.25° rms or less.	With SYNCHRONOUS TIME CONSTANT switch set to SLOW.
Synchronous Detector Phase Response		See Fig. 1-6.
Zero Carrier Reference Gate		
Carrier Cutoff	50 dB or greater.	Zero carrier ±0.5 IRE.
Width	30 μs ±10%.	
Delay		20 μs ±10% from leading edge of sync.
Timing	Factory set to Line 20 of both fields.	Internally selectable from lines 10 through 25 of both fields.
Ext ZERO CARRIER REFERENCE DRIVE INPUT		
Z_{in} and Connector		Approximately 5 kΩ bnc (rear panel).
Level Required		Approximately +1 V. Accepts input from TEKTRONIX 1440 set for positive output.



EXAMPLE: A transmitter with 10° of input phase variation modulated at 60 Hz will produce an output signal with 6° (60% response) phase variation when synchronous detection and the SLOW TIME CONSTANT settings are used (in any synchronous mode).

In the NORMAL SYNC TIP SYNCHRONOUS detection mode, the phase variation will reduce to only 1° (10% response).

2200-06

Fig. 1-6. Synchronous Detector Phase Response.

Table 1-1 (cont)

Characteristics	Performance Requirement	Supplemental Information
Audio Characteristics		
Frequency Response (De-emphasis out)	±0.4 dB	30 Hz to 15 kHz. (30 Hz to 20 kHz after B010362.)
De-emphasis in	±0.5 dB from 75 μs de-emphasis curve. (See Fig. 1-7.)	30 Hz to 15 kHz. (30 Hz to 20 kHz after B010362.)
Harmonic Distortion	0.2% or less.	30 Hz to 15 kHz at full output with ±25 kHz deviation.
Audio Signal-to-Noise Ratio		With ±25 kHz deviation and 1 kHz modulation.
Intercarrier	55 dB or greater.	
Split Carrier	75 dB or greater.	
EXT AURAL INTER-CARRIER IN	75 dB or greater.	
AURAL ONLY	75 dB or greater.	

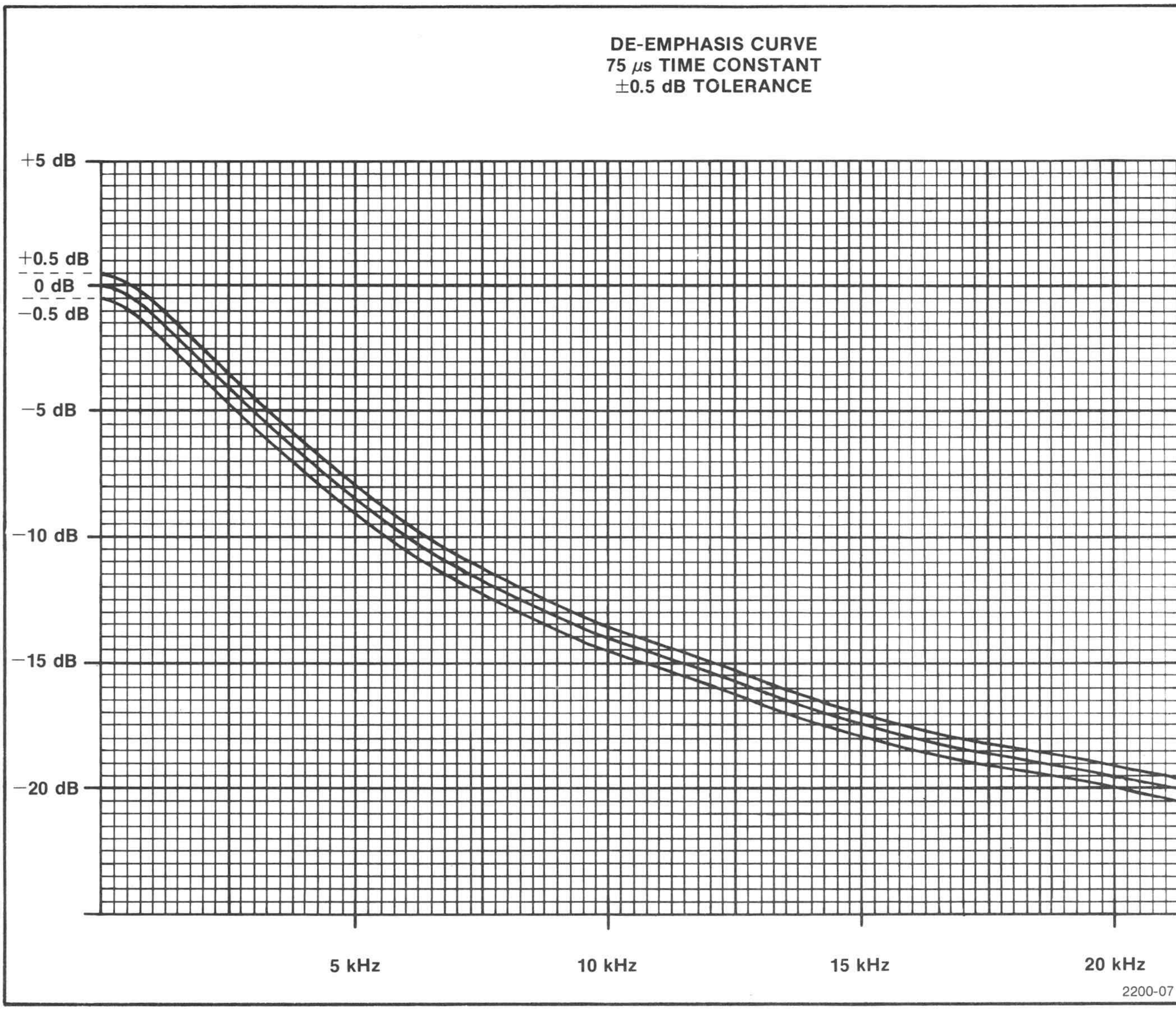


Fig. 1-7. Audio De-Emphasis Frequency Response.

Table 1-1 (cont)

Characteristics	Performance Requirement	Supplemental Information
DEVIATION OUTput		
Z_O and Connector		600 Ω bnc (rear panel).
Level	50 mV peak/kHz deviation ±1%.	20 kHz/Volt ±1%. (Note: ±25 kHz deviation produces 2.5 V p-p.)

Table 1-1 (cont)

Characteristics	Performance Requirement	Supplemental Information
AURAL INTERCARRIER IN		
Z_{in} and Connector		50 Ω bnc (rear panel).
Return Loss	20 dB or greater.	
Level	−30 dBm ±5 dB.	
Frequency	4.5 MHz ±1 kHz.	
AURAL INTERCARRIER OUT		
Z_O and Connector		50 Ω bnc (rear panel).
Return Loss	20 dB or greater.	
Level		Nominal −6 dBm up to 0 dBm. (Depends on Aural/Visual ratio.)
AUDIO OUTPUT 600 Ω BALANCED LINE		
Level	Factory set to +10 dBm with ±25 kHz deviation.	Internally adjustable from at least −10 dBm to +15 dBm.
Connector		XLR male (rear panel).
8 Ω SPEAKER Output		
Level	Up to at least 5 W rms.	Front-panel adjustable.
Connector		Barrier block (rear panel).
Headphone OUTPUT		
Level	Up to at least 50 mW.	Accepts mono or stereo style phones.
Connector		Phone jack (front panel).
REMOTE Connector		9 pin Cinch (rear panel).
Alarm Output		SPDT relay contacts rated at 28 V, 3 A, maximum. Pins 8 and 9 close for alarm or loss of power. Pins 7 and 8 open for alarm or loss of power.
External Synchronous/ Envelope Switch		Ground pin 6 for envelope detection (front-panel switches in desired Synchronous mode).
Electromagnetic Susceptability	Up to 10 V/Meter.	
Damage Level at RF Input	1 W maximum.	At any attenuator setting.

Table 1-1 (cont)

Characteristics	Performance Requirement	Supplemental Information
Power-Supply Characteristics		
Mains		
Power	100 W maximum.	90 W nominal.
Voltage Range		
115 V Low	90 V to 110 V.	
115 V High	108 V to 132 V.	
230 V Low	198 V to 242 V.	
230 V High	216 V to 250 V.	
Fuse Data		
115 V		1.25 A Slo-Blo.
230 V		0.6 A Medium-Blo.
Frequency	48 to 62 Hz.	
Crest Factor		At least 1.3 (p-p rms).
Internal Supply		
Accuracy		
+5 V		±1% at 1.5 A.
+15 V		±1% at 1.5 A.
−15 V		±0.5% at 1.5 A.
Ripple	1 mV or less.	All supplies.
Line Regulation	5 mV or less.	All supplies.
Safety		
Insulation Stress		
Primary Circuit		Withstands 1500 V rms. 50 to 60 Hz for 10 seconds.
Grounding Circuit		0.1 Ω maximum.

Table 1-2

ENVIRONMENTAL CHARACTERISTICS

Characteristics	Information
Temperature	
Operating	0° C to 50° C.
Storage	−40° C to +65° C.
Altitude	
Operating	To 15,000 feet.
Storage	To 50,000 feet.

Table 1-3

PHYSICAL CHARACTERISTICS

Characteristics	Information
Dimensions	See Fig. 1-8.
Length	19 1/8" (48.58 cm)
Width	19" (48.26 cm)
Height	5 1/4" (13.34 cm)
Weight	36 lb (16.33 kg)

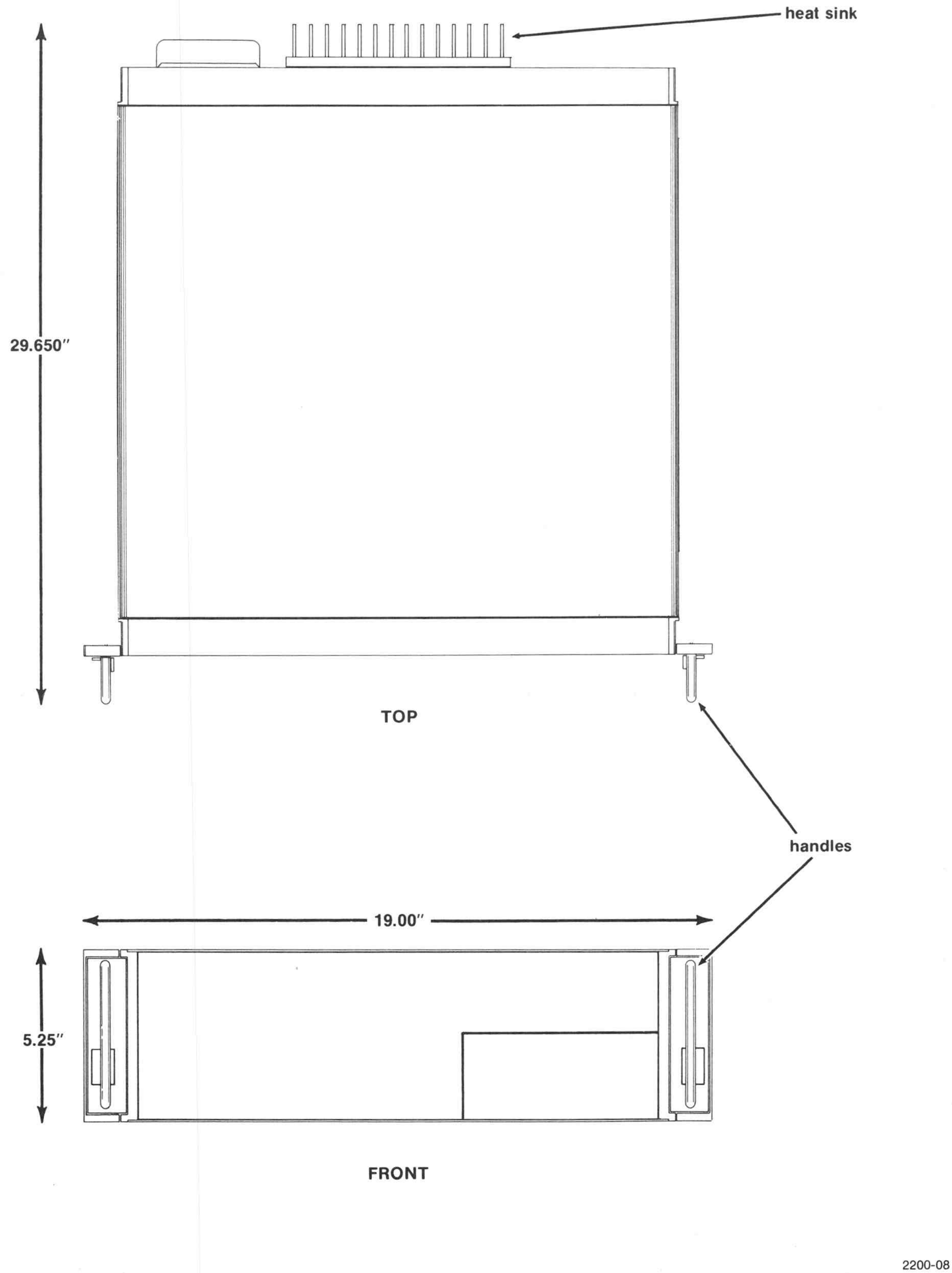


Fig. 1-8. Dimensional Drawing.

Table 1-4

1450-1 Standard Accessories List

Quantity	Item	Tektronix Part No.
1	Power Cables; 8 ft. long	161-0066-00
1	Rackmount Slide Guide (Pair) Up to Serial Number B010199 Serial Number B010199 and up	 351-0487-00 351-0301-01
1	Instruction Manual	070-2200-00
1	N to BNC Adapter	103-0045-00
1	Extender ECB	670-5034-00
1	Remote Connector Assembly: Male Connector Hood Screw (2 each)	 131-1007-00 200-1170-00 213-0260-00
1	50 Ω Coaxial Cable with BNC Connectors	012-0751-00
1	50 Ω Double-Shielded Coaxial Cable with SMA Connectors	012-0752-00
2	BNC to Square-Pin Adapter Cables	175-2140-00
1	BNC to Peltola Adapter Cable	067-0709-00
1	TORX Screwdriver	003-0816-00
1	0.6 A Medium-Blo Fuse for 230 V Range	159-0043-00
1	External Phase Graticule	331-0393-12
1	250 kHz Low Pass Filter	015-0352-00

OPERATING INSTRUCTIONS

This section includes information on the functions of the controls, connectors, and indicators; how to use the demodulator; and installation procedures.

CONTROLS AND CONNECTORS

Front Panel (See Fig. 2-1)

(1) **POWER**—Turns instrument power on and off. Power "on" is indicated by a green LED (light-emitting diode).

DETECTION MODE—These self-canceling pushbuttons determine the type of detection used.

(2) **ENV**—Selects the Envelope detection mode. This mode is used in conjuction with the Synchronous detector to measure transmitter distortions caused by incidental phase. Envelope detection is not recommended for normal use because it introduces quadrature distortion into the signal.

SYNCHRONOUS—Selects the Synchronous detection modes.

(3) **BACK PORCH**—The normal detection mode. Reference phase samples are taken during the Back Porch period where the reference signal is normally subject to the least phase distortion.

(4) **SYNC TIP**—Reference phase samples are taken during the Sync Tip time. The Sync Tip detector may be used in conjunction with the Back Porch detector to check for effects caused by carrier phase-shift of the sync pulse.

(5) **CONT**—The phase-lock correction is continuously applied in this mode.

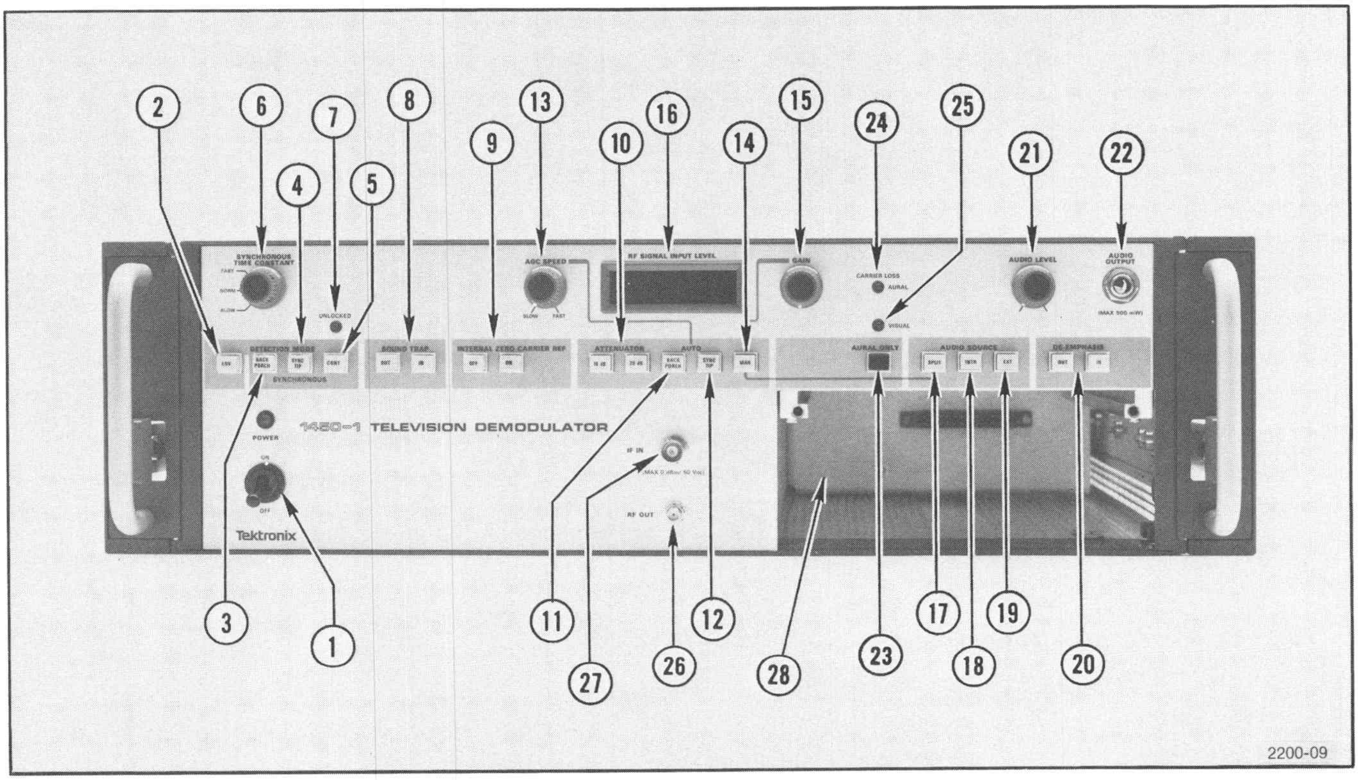


Fig. 2-1. 1450-1 Front Panel Controls, Connectors, and Indicators.

(6) **SYNCHRONOUS TIME CONSTANT**—This switch sets the phase-lock loop bandwidth. A slow time-constant allows transmitter phase-jitter to pass through the demodulator for measurement. A fast time-constant will cause the demodulator to track the jitter, eliminating it as a source of interference for other measurements.

(7) **UNLOCKED Light**—A red LED indicates that phase lock (required for synchronous detection) has not been achieved. The demodulator is automatically switched to the Envelope detection mode when this light is on.

(8) **SOUND TRAP**—Selects the bandwidth of the IF (intermediate frequency) system. With the sound trap OUT, the wide-band filter is selected. When the sound trap is IN, the narrow-band filter is selected.

(9) **INTERNAL ZERO CARRIER REF**—When the ON button is pushed, a Zero Carrier Reference signal is generated and inserted on the signal during a selected line.

(10) **ATTENUATOR**—These buttons select attenuation of the input signal in 10 dB steps. 0 dB is selected with both buttons out, and 30 dB is selected with both buttons pushed in. The readout still indicates the correct input power with the attenuators in or out.

AUTO—Selects either Back Porch or Sync Tip reference Automatic Gain Control (AGC).

(11) **BACK PORCH**—Video output is automatic gain controlled (to 1 V p-p composite video) referenced to the back porch at 0 V.

(12) **SYNC TIP**—Video output is automatic gain controlled (to 1 V p-p composite video) referenced to the sync tip at −286 mV.

(13) **AGC SPEED**—A potentiometer that determines the speed of the agc.

SLOW—Shows hum and low-frequency noise.

FAST—Masks low-frequency noise and hum to display a more stable signal.

(14) **MAN**—This mode disables the agc and allows manual control of the output amplitude. It can be used to monitor amplitude shifts on a waveform monitor.

(15) **GAIN**—This control is a three-turn potentiometer that controls the gain of the video output signal in the manual mode.

(16) **READOUT**—The LED readout is calibrated to indicate the input power level in dBm (0 dBm equals 1 mW). When the input power level is out of the agc range, one of the two diodes on the right side of the readout will light. The upper LED indicates the signal is too high, and the lower LED indicates that the signal is too small. When using the Manual Gain control, the correct output voltage will be obtained and the correct input power indicated when both of the diodes on the right side are out. The readout also indicates correctly with the attenuators in or out.

AUDIO SOURCE—The buttons select the type of audio desired.

(17) **SPLIT**—Selects Split Carrier. Source is the difference between the aural carrier and an oscillator at the visual carrier frequency.

(18) **INTR**—Selects Intercarrier. Source is the difference between the aural carrier and the visual carrier. PM noise on the visual carrier will be added to the audio in this mode.

(19) **EXT**—Selects the signal fed to the External AURAL INTERCARRIER IN connector.

(20) **DE-EMPHASIS**—Selects whether de-emphases is applied to the audio signal or not.

IN—This is the normal setting for monitoring. De-emphasis is applied according to the FCC 75 μs curve.

OUT—Passes the sound signal through a flat amplifier. This is used for checking the aural transmitter.

(21) **AUDIO LEVEL**—Controls the level of the low-impedance audio output signals.

(22) **AUDIO OUTPUT**—A phone jack for headphone monitoring and testing using the audio.

(23) **AURAL ONLY**—When the MAN gain, SPLIT AUDIO SOURCE, and AURAL ONLY buttons are all pushed in, the demodulator will lock to the aural transmitter carrier with no picture carrier present.

CARRIER LOSS

(24) **AURAL Alarm Light**—A red LED, when lit, indicates loss of the aural carrier. In the AGC mode, a loss of the visual carrier will also cause the AURAL alarm to light. In the MANUAL GAIN mode, the AURAL alarm acts independently.

(25) **VISUAL Alarm Light**—A red LED, when lit, indicates loss of the visual carrier. The instrument must be in the AGC mode.

(26) **RF OUT**—A 50 Ω SMA connector provides output of the RF signal from the rear-panel RF INPUT through the 0 to 30 dB attenuator. A 50 Ω SMA-to-SMA cable makes a reliable connection of the signal path from the mainframe to the plug-in.

(27) **IF IN**—A 50 Ω bnc input. Accepts the specified intermediate frequency (IF) at −64 dBm to −20 dBm from the DOWN CONVERTER or from an external 50 Ω source (i.e., transmitter IF).

NOTE

An external signal applied directly to the IF IN connector will cause the readout to read 4.7 dB less than the actual signal level. For example, a −20 dBm signal at the IF Input will cause a readout display of −24.7 dBm.

(28) **DOWN CONVERTER Plug-In**—Contains the RF front end, tuned to the specified channel frequencies. Converts the RF to the specified IF with the aural IF 4.5 MHz below the visual IF.

Rear Panel (See Fig. 2-2)

(29) **AURAL INTERCARRIER IN**—A 50 Ω bnc input for an external 4.5 MHz FM drive signal.

(30) **AURAL INTERCARRIER OUT**—A 50 Ω bnc output for an external 4.5 MHz audio subcarrier.

(31) **DEVIATION OUT**—Audio directly out of the discriminator calibrated for 50 mV peak/kHz deviation. A sinewave signal with ±25 kHz deviation produces a 2.5 V p-p output signal.

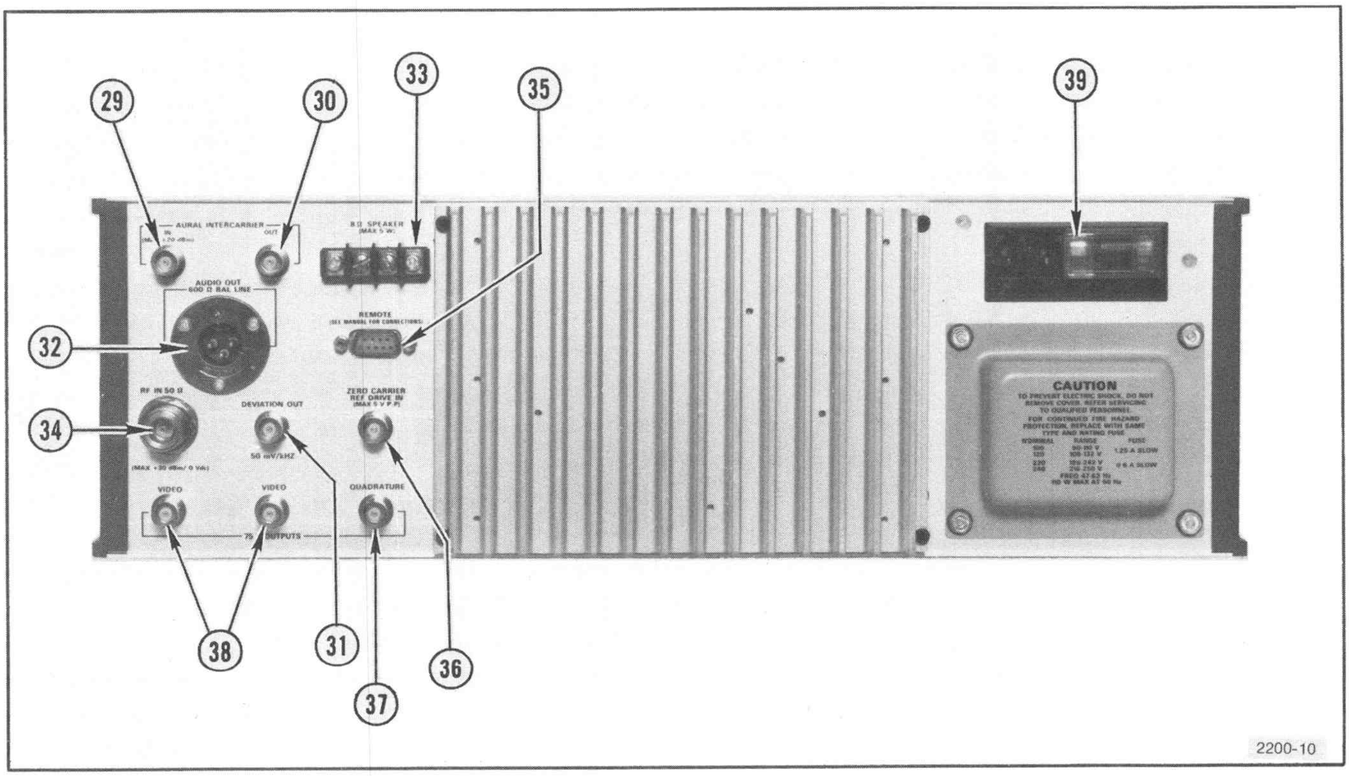


Fig. 2-2. 1450-1 Rear Panel Connectors.

(32) **600 Ω BALANCED LINE**—600 Ω audio output. (XLR-3-14 male connector; mates with Cannon XLR-3-11SC or equivalent.)

(33) **8 Ω SPEAKER**—A two-terminal barrier strip for connection of an 8 Ω speaker.

(34) **RF INPUT**—A 50 Ω input (N connector).

(35) **REMOTE**—A connector which supplies open and closed circuit contacts corresponding to a loss of carrier. These contacts can be used to drive a remote carrier-loss alarm. A remote envelope detection mode switch line is also included.

(36) **ZERO CARRIER REF DRIVE INPUT**—Accepts a positive-going external Zero Carrier Reference pulse (from TEKTRONIX 1440).

(37) **QUADRATURE**—75 Ω output of the quadrature detector. This signal can be used in conjunction with the video output on a high-frequency XY monitor or a 1480 Waveform Monitor with an external phase graticule (Tektronix Part Number 331-0393-12) and low-pass filter to provide a vector presentation of the RF signal.

(38) **VIDEO OUTPUT**—Two 75 Ω bnc connectors provide the demodulator video.

(39) **POWER CONNECTOR/FUSE HOLDER**—Contains the power-cord receptacle, the fuse holder, and the line-voltage selector. Line-voltage selection is done via a plug-in circuit board.

USING THE DEMODULATOR

The 1450-1 Television Demodulator may be used for accurate transmitter measurements, and for monitoring and rebroadcast of broadcast signals.

Applying a Signal

The RF IN impedance to the 1450-1 is 50 Ω. At high frequencies, impedance mismatches between the RF IN and the signal source can cause reflections in the transmission line, and degrade instrument performance. To reduce mismatch, use good quality 50 Ω coaxial cable to connect the signal source to the RF IN, and keep the cable as short as possible to reduce cable losses.

The 1450-1 can be used with a 75 Ω signal source by using a 75 Ω-to-50 Ω minimum loss pad or matching transformer. If an antenna is used, its bandpass characteristics should be known.

Sensitivity and power levels are often rated in dBm (dB with reference to 1 mW, regardless of impedance). Sensitivity and power levels for 75 Ω systems are usually rated in dBmV (dB with reference to 1 mV across 75 Ω). Figure 2-3 gives a convenient chart for converting volts to dBm to watts. To convert dBm to dBmV, add 48.75 to dBm.

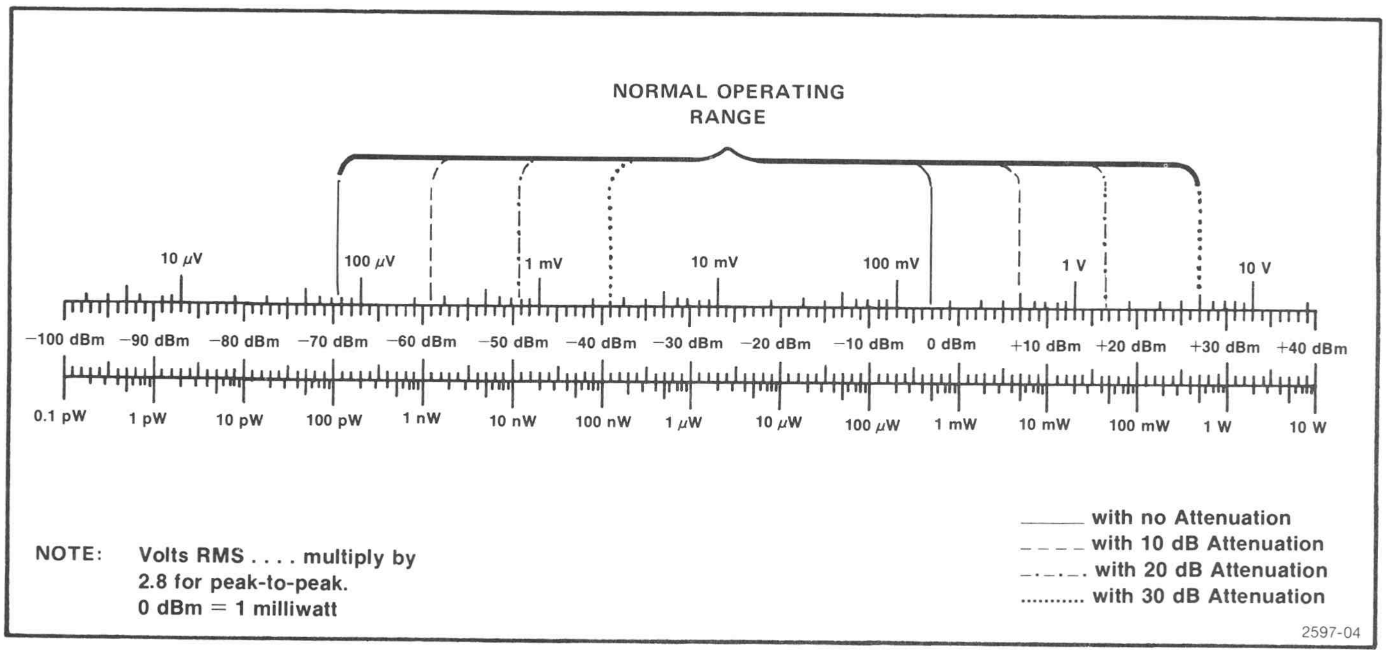


Fig. 2-3. Volts-dBm-Watts Conversion Chart for 50 ohm Impedance.

Signals fed to the 1450-1 should be between −69 dBm and −3 dBm. The front-panel 10 dB and 20 dB ATTENUATORS may be switched in to accept signals to +27 dBm. If signals larger than +27 dBm are encountered at transmitter test points, external pads should be inserted to bring the signal within the agc range.

Verifying the Demodulator

In the 1450-1, effects of the demodulation process are minimized and allowed for in the instrument specifications. However, to improve the accuracy of some measurements it is useful to know how the demodulator affects a test signal. This information can be included in the evaluation of a demodulated signal to determine more precisely how the circuit under test is performing.

The demodulator may be verified by feeding a set of test signals through an RF modulator with known characteristics to the demodulator. To determine the demodulator characteristics, combine (normalize) the characteristics of the modulator with the output obtained from the demodulator, and compare the results with the input signal. If the modulator has a negligible effect on the signal, a set of waveform photographs may be taken, and used as a record of the demodulator performance. Figure 2-4 shows a set of test-signal waveform photographs obtained from a typical 1450-1 driven with a good quality test modulator.

If a modulator is not available, the waveforms in Fig. 2-4 may be used to get an idea of how any 1450-1 is probably affecting the signal.

Monitoring and Rebroadcast

The 1450-1 may be used as an in-service transmitter demodulator to monitor VIT signals, either at the transmitter or at a remote site. It may also be used as a high quality receiver for CATV or to pick up a network feed from another station for rebroadcast.

Typical 1450-1 control settings for the monitoring mode are:

DETECTION MODE	SYNCHRONOUS, BACK PORCH
SYNCHRONOUS TIME CONSTANT	NORM
SOUND TRAP	IN
INTERNAL ZERO CARRIER REF	ON
ATTENUATOR	As needed
Gain Control	BACK PORCH AGC
AGC SPEED	FAST for Rebroadcast SLOW for Monitoring
AURAL ONLY	Out
AUDIO SOURCE	SPLIT (INTR to check Intercarrier buzz
DE-EMPHASIS	IN

Synchronous detection will give the most accurate results except in the special case where the transmitter has appreciable incidental-carrier phase modulation (ICPM) that cannot be corrected, and has been adjusted using envelope detection. In this case, envelope detection should also be used for monitoring. (ICPM is discussed later in this section.)

Measuring the Visual Transmitter

Most visual transmitter adjustments and measurements should be made with the demodulator in the synchronous detection mode and the wide-band IF filter selected. The visual transmitter envelope delay precorrection, and the aural transmitter should be off. Figure 2-5 shows some typical transmitter measurement points.

Typical 1450-1 control settings are:

DETECTION MODE	SYNCHRONOUS, BACK PORCH (ENV for phase and delay checks
SYNCHRONOUS TIME CONSTANT	NORM
SOUND TRAP	OUT
INTERNAL ZERO CARRIER REF	ON
ATTENUATOR	As needed
Gain Control	BACK PORCH AGC
AURAL ONLY	Out

Differential phase, burst-to-subcarrier phase, and envelope delay should be measured in the envelope detection mode, and then verified with synchronous detection. Any differences observed when switching between the envelope and synchronous modes are indications of incidental-carrier phase modulation (ICPM). If the ICPM cannot be corrected, adjust the transmitter using the envelope detector for these measurements. This should result in the best picture on a typical home receiver.

Incidental Carrier Phase Modulation. ICPM is a change in carrier phase with a signal level change. This shows up as apparent differences between measurements made in synchronous and envelope detection modes. Differential phase, color bar phase errors, low-frequency delay, and other test signal errors are affected. On home receivers, with envelope detectors, the picture will be unaffected if the visual transmitter has been adjusted using envelope detection when there is appreciable ICPM. However, the ICPM can show up in the home receiver's audio as intercarrier buzz.

ICPM can have many sources. The following changes with signal level are some of the sources: input impedance

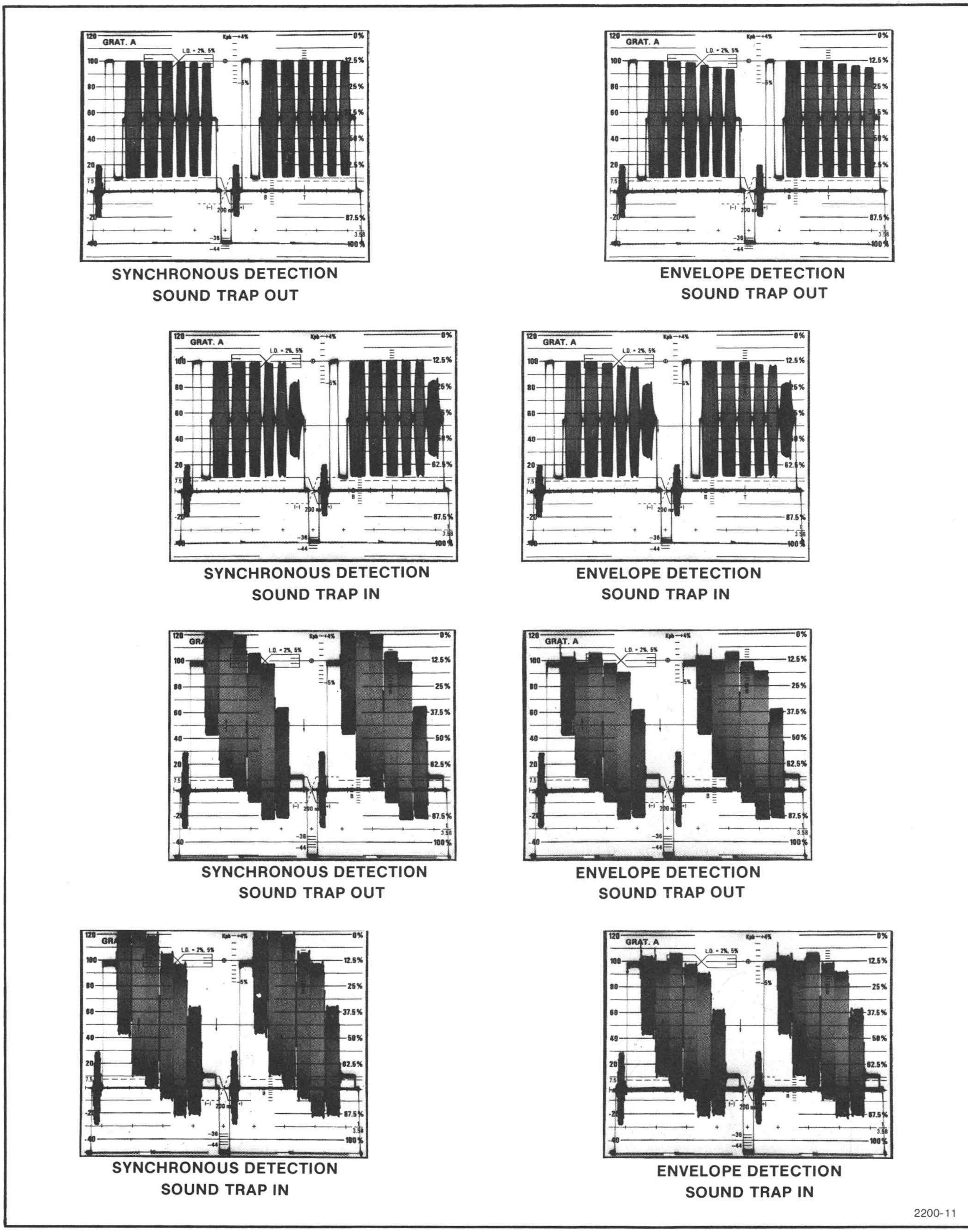


Fig. 2-4. 1450-1 Response to Typical Test Signals.

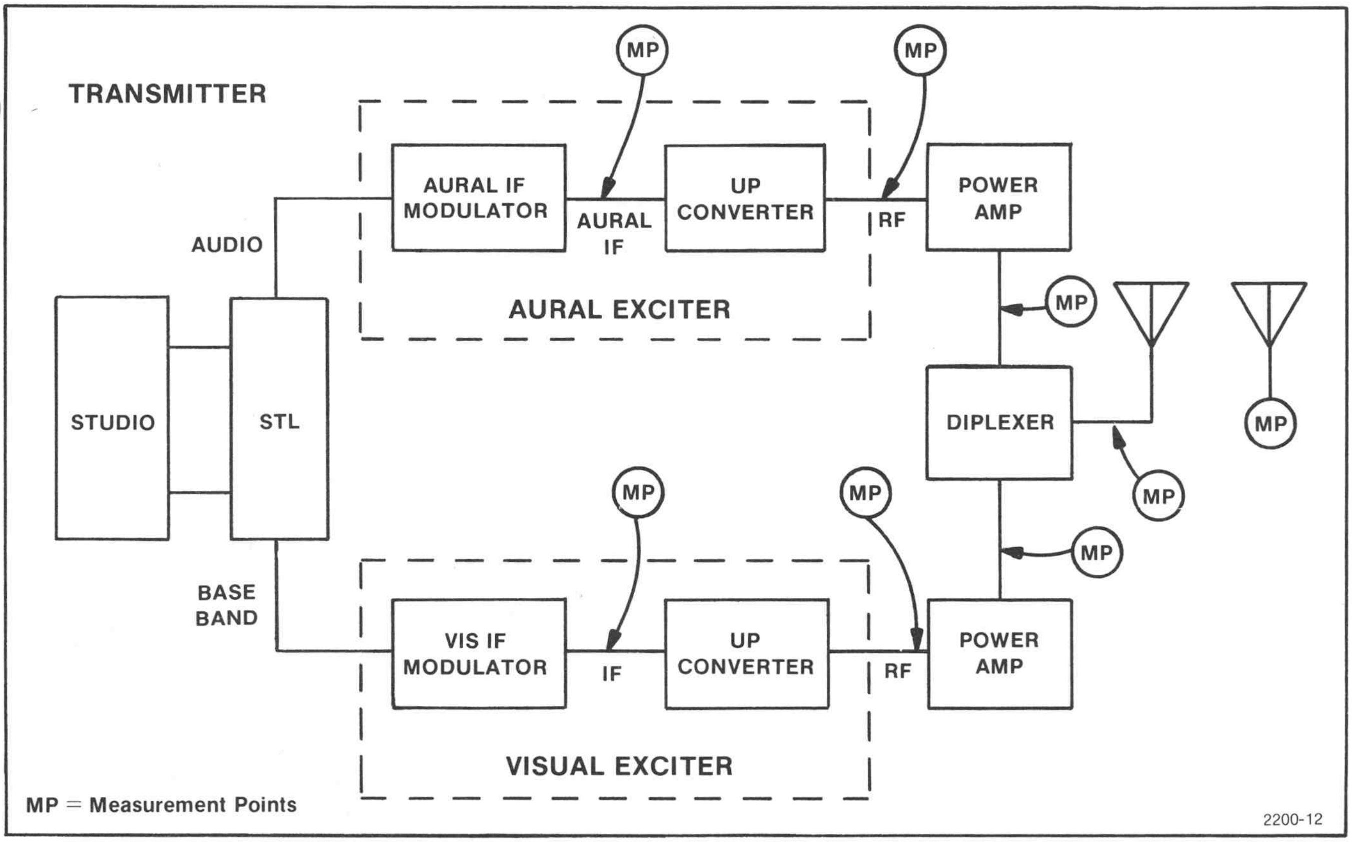


Fig. 2-5. Typical Transmitter Measurement Points.

and other changes in linear amplifiers, carrier feedthrough, and electrical length changes in uhf klystron and traveling-wave tubes.

With the 1450-1 in the SYNCHRONOUS DETECTION MODE, a very useful polar coordinate display can be created to measure ICPM. Using an XY monitor, or an oscilloscope or waveform monitor with an external horizontal input, the in-phase VIDEO OUT signal is applied to the vertical input (as usual), and the QUADRATURE OUT signal is applied to the horizontal input. Figure 2-6 shows typical ICPM test setups.

Use an unmodulated, 0 to 100 IRE, 10-step staircase or ramp as the test signal. The SYNC TIP DETECTION mode will cause the sync tip to line up with the zero carrier reference pulse at 0 degrees. If no ICPM is present on the carrier, the display between sync and zero carrier will line up on the vertical axis. If ICPM is present, the display will tilt. The amount of ICPM can be found by measuring the angle of the tilt from the vertical axis. Find the point of maximum tilt, and measure the amount of deflection horizontally and vertically from the zero carrier reference pulse. Calculate the amount of ICPM using the formula:

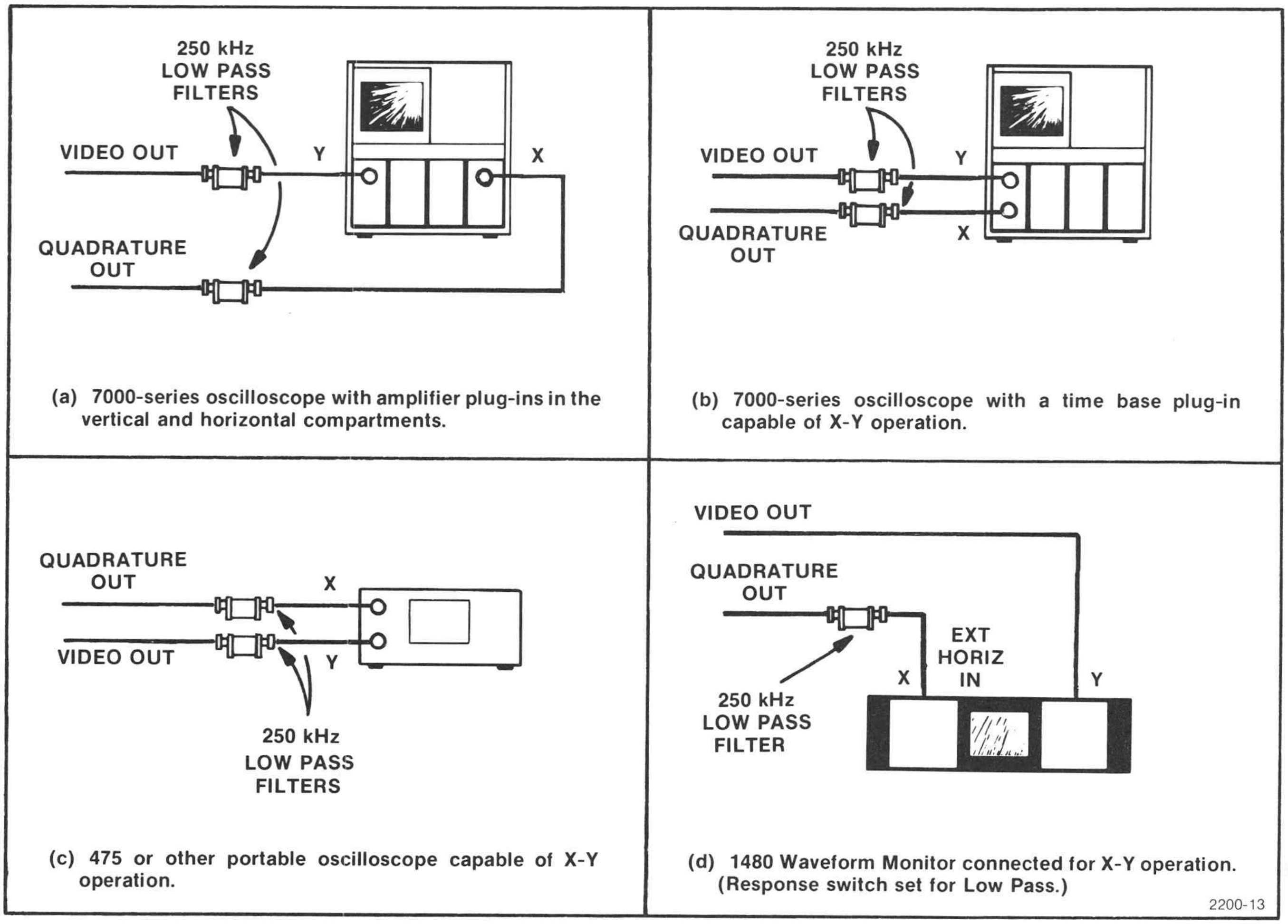
ICPM (in degrees) = arctan (horizontal deflection/vertical deflection)

EXAMPLE: An oscilloscope set up for XY operation gives the display shown in Fig. 2-7. The back porch of a 10 step staircase signal is the maximum point of tilt from the center (0 degree line). The vertical amplifier is set for 0.2 V/div, and the horizontal amplifier is set for 20 mV/div. The back porch is located 4.5 vertical divisions and 2 horizontal divisions from the zero carrier reference pulse. Find the amount of ICPM.

SOLUTION: Vertical deflection = 0.2 V/div X 4.5 div
= 900 mV

Horizontal deflection = 20 mV/div X 2 div
= 40 mV

ICPM = arctan (40 mV/900 mV)
= arctan 0.0444
= 2.5 degrees



(a) 7000-series oscilloscope with amplifier plug-ins in the vertical and horizontal compartments.

(b) 7000-series oscilloscope with a time base plug-in capable of X-Y operation.

(c) 475 or other portable oscilloscope capable of X-Y operation.

(d) 1480 Waveform Monitor connected for X-Y operation. (Response switch set for Low Pass.)

Fig. 2-6. Incidental Carrier Phase Modulation (ICPM) Measurement Setups.

For all but very clean test signals, a low-pass filter in both the horizontal and vertical channels will be helpful in reducing clutter on the display. A filter designed for this purpose is available from Tektronix (Tektronix Part No. 015-0352-00). Figure 2-8 shows the effect of low-pass filtering on a typical test signal.

An external graticule (Tektronix Part No. 331-0393-12) for the TEKTRONIX 1480 Waveform Monitor has been developed to measure ICPM. (See Fig. 2-9.) To use this graticule, connect the QUADRATURE OUT through a 250 kHz low-pass filter to the 1480 External Horizontal input, and the VIDEO OUT directly to a vertical input. Set the 1480 for Low-Pass Response, appropriate vertical input channel, 1.0 Volts Full Scale, X25 Magnifier, and Ext Horizontal.

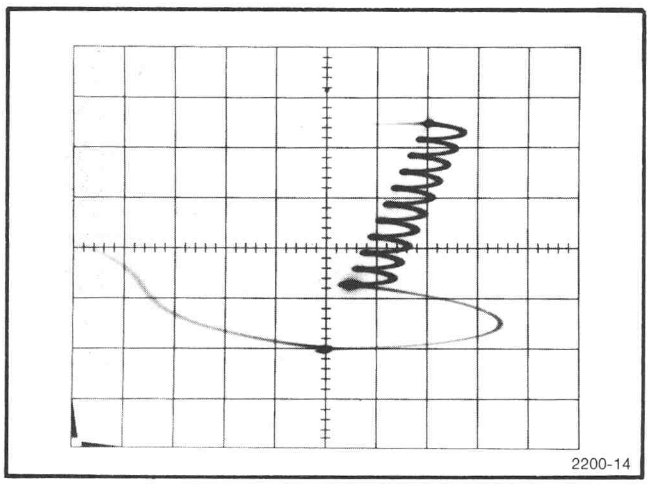
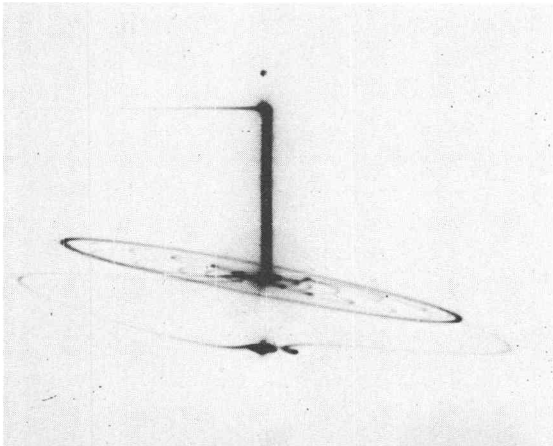
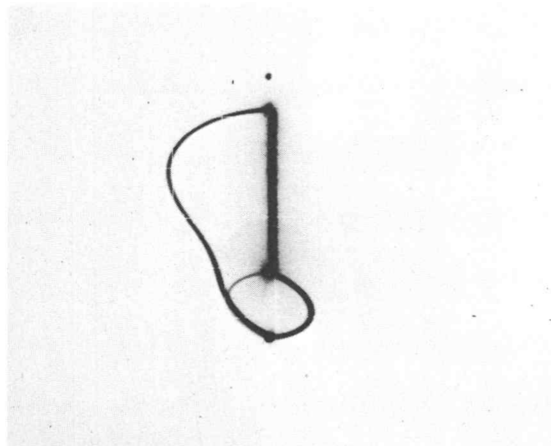


Fig. 2-7. ICPM Example.

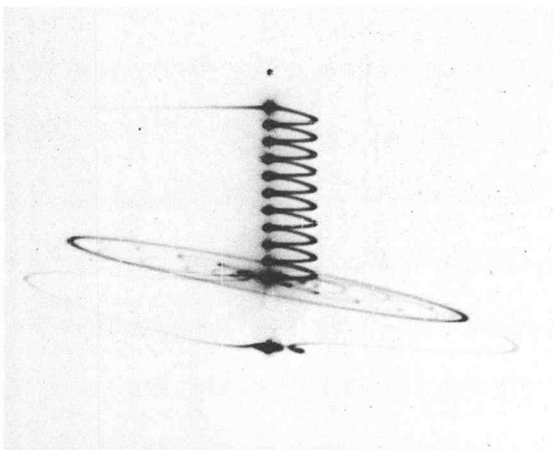
@



(a) Ramp without filters.



(b) Ramp with filters.



(c) 10 step staircase without filters.



(d) 10 step staircase with filters.

2200-15

Fig. 2-8. Effect of Low Pass Filters on ICPM Measurement.

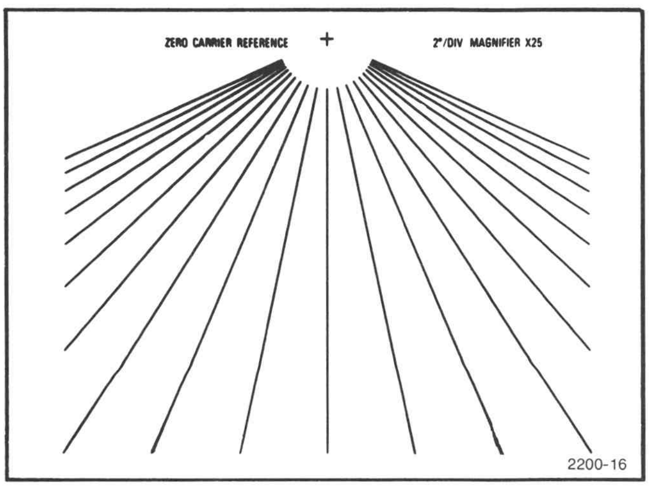


Fig. 2-9. External Phase Graticule for 1480 Waveform Monitor.

NOTE

TEKTRONIX 1480 Waveform Monitors are shipped from the factory with the Ext Horizontal function disabled to prevent accidental crt burns. Qualified service personnel should consult the 1480 Instruction Manual or contact their local Tektronix Field Office for information on connecting the 1480 for External Horizontal operation.

Position the zero carrier reference pulse (top of the displayed signal) to the location marked on the graticule. The graticule is calibrated for 2 degrees per radial division when the Magnifier is set for X25, and 1 degree per division with X50 magnification. Measure any ICPM directly from the graticule.

TEKTRONIX 465/475 portable oscilloscopes and 7000-Series oscilloscopes with appropriate plug-ins make very good XY displays. Low-Pass filters should be installed in both the horizontal and vertical inputs of these oscilloscopes. Consult the appropriate instruction manual for information on XY operation.

Visual Transmitter Precorrection

The 1450-1 may be used with the TEKTRONIX 1440 Automatic Video Corrector in a loop around the transmitter for automatic transmitter precorrection.

Refer to the 1440 manual for further information about precorrection.

NOTE

The 1450-1 requires a positive-going external Zero Carrier Reference Pulse. The TEKTRONIX 1440 is factory-set with a negative-going pulse. A qualified service technician should refer to the Installation and Programming section of the 1440 manual for information regarding changing the Zero Carrier Reference Pulse polarity.

Measuring the Aural Transmitter

The 1450-1 has a high quality audio section. Both split and intercarrier sound systems are used. An External AURAL INTERCARRIER IN is also available.

The SPLIT sound mode uses a reference oscillator at the picture carrier frequency to beat with the aural IF producing the 4.5 MHz intercarrier frequency. This results in very clean audio from the demodulator.

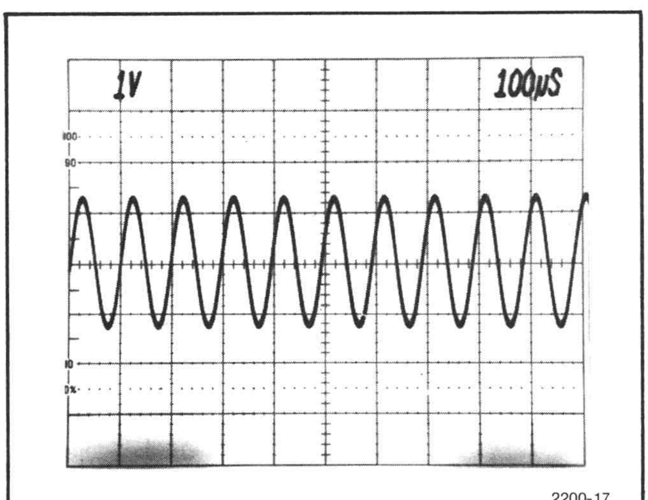


Fig. 2-10. Measuring Deviation on an Oscilloscope.

The INTR (Intercarrier) AUDIO SOURCE uses the picture carrier, which has been limited, to beat with the aural IF. Any fm or pm in the picture signal will show up in the audio in this mode.

Out-of-service aural transmitter measurements and adjustments may be performed using the AURAL ONLY mode. This mode locks the 1450-1 to the aural carrier when the visual carrier is off.

Typical 1450-1 control settings for the AURAL ONLY mode are:

ATTENUATOR	As needed
Gain Control	MAN
GAIN	Set for about 0 dBm (0.6 V p-p into 50 Ω) signal at AURAL INTERCARRIER OUT
AURAL ONLY	In
AUDIO SOURCE	SPLIT
DE-EMPHASIS	OUT (except when testing Pre-emphasis)
AUDIO LEVEL	As needed

The rear-panel DEVIATION OUTPUT is calibrated to 50 mV peak/kHz deviation. This signal is useful for checking deviation output on an oscilloscope. Figure 2-10 shows a waveform photograph of the DEVIATION OUTPUT signal with ±25 kHz deviation. Note that the signal amplitude is 2.5 V p-p.

NOTE

The FCC has very stringent requirements regarding the type acceptance of aural modulation monitors (FCC Rules and Regulations 73.690—73.694), and a monitor meeting these requirements must be used as the primary station monitor. The 1450-1 DEVIATION OUTPUT is an excellent secondary source for supplemental measurements and monitoring.

INSTALLATION

NOTE

At installation time, save the shipping carton and packing materials for repackaging in case reshipment becomes necessary.

ELECTRICAL INSTALLATION

Down Converter

Slide the down converter into the slot in the 1450-1 mainframe. Be sure that the down converter is firmly seated, then secure it in place with the two thumbscrews.

Using the 50 Ω bnc and SMA cables from the accessories kit, connect the RF and IF signal lines between the mainframe and the down converter. The SMA connectors should be screwed down at least finger tight.

Power Source

This instrument is intended to operate from a single-phase power source having one of its current-carrying conductors at or near earth ground (the neutral conductor). Only the Line conductor is fused for over-current protection. Systems that have both current-carrying conductors live with respect to ground (such as phase-to-phase on multi-phase systems) are not recommended power sources.

Mains Frequency and Voltage Ranges

The 1450-1 operates over a frequency range of 48 to 62 Hz, and at nominal mains voltages of 100 Vac, 120 Vac, 220 Vac, or 240 Vac.

A rear-panel voltage selector eases selection of any of these nominal voltages.

WARNING

When changing to 220 Vac or 240 Vac operation, use a power cable with appropriate voltage ratings (i.e., Tektronix Part No. 161-0066-01). Product Safety requires this exact power cable be called out.

Mains Conversion

Mains voltage selection is accomplished by means of a small circuit board in the power connector-fuse holder assembly on the rear-panel. See Fig. 2-11.

To change mains voltage ranges, remove the power cord, open the cover, and pull the fuse lever down. Insert a pointed tool in the hole at the edge of the voltage-change board and gently pull out of the holder.

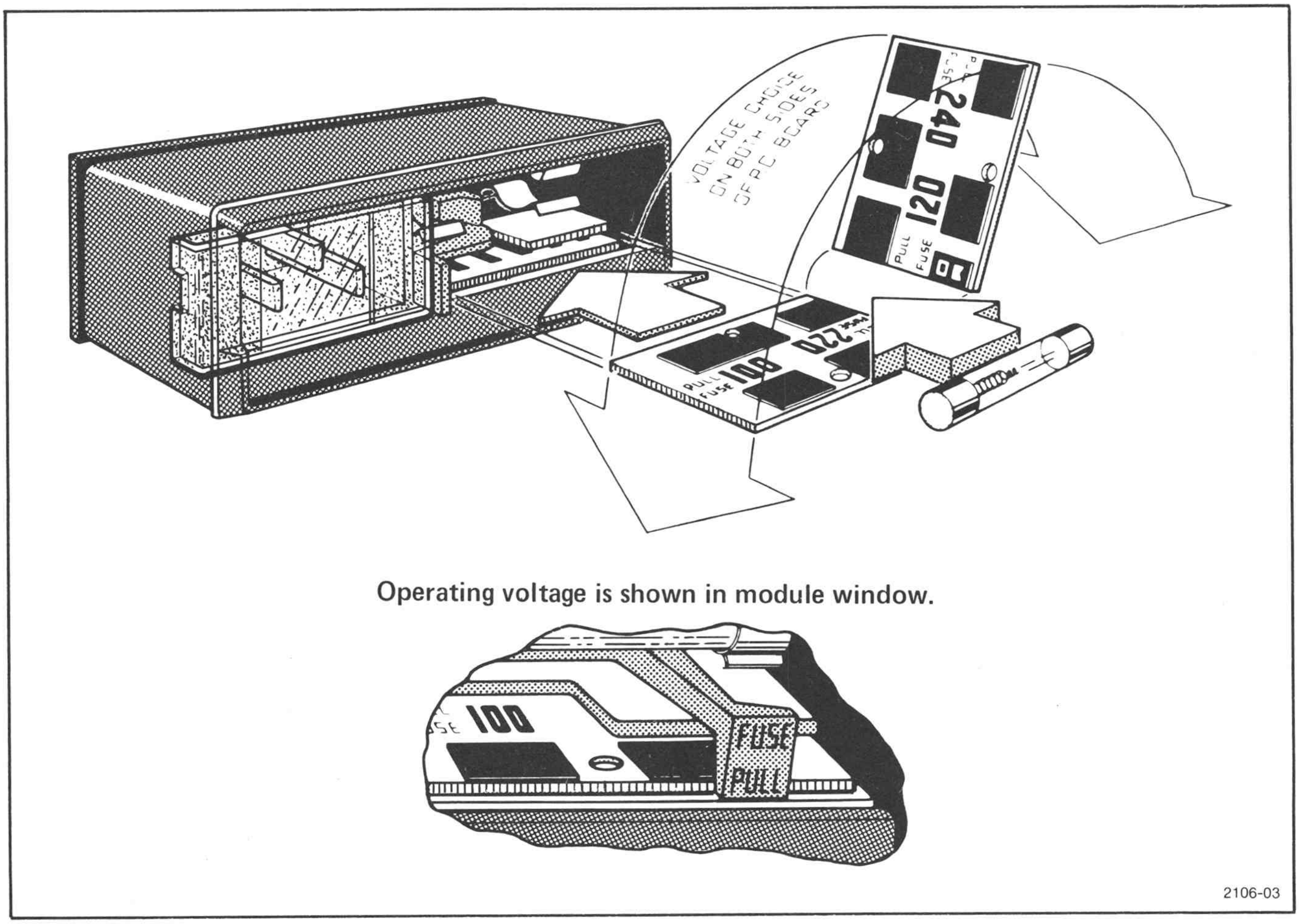


Fig. 2-11. Changing Mains Voltage.

Remote Connections

The REMOTE connector on the rear panel may be wired for remote selection of the envelope detection mode, and for an external carrier-loss alarm. See Fig. 2-12 for the pin locations of the REMOTE connector.

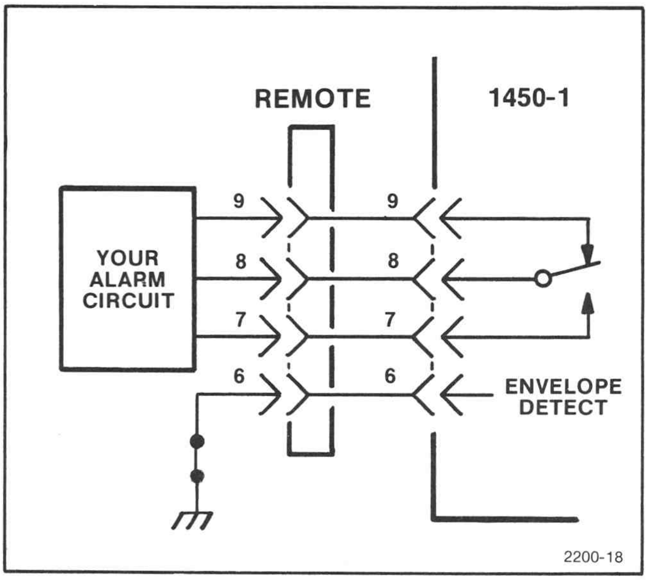


Fig. 2-12. REMOTE Connector Wiring.

Remote Envelope Switch. Some measurements require that the demodulator be switched between the envelope and synchronous detection modes. If other measuring equipment is located away from the demodulator, it may be useful to have an external envelope/synchronous switch. This can be accomplished by setting the demodulator for the synchronous mode, and connecting an external switch between pin 6 of the REMOTE connector and ground. Grounding pin 6 will put the 1450-1 in the envelope mode.

Remote Carrier-Loss Alarm. The demodulator can be used to activate an alarm circuit that will indicate the loss of a transmitter carrier. A SPDT relay inside the 1450-1 switches when either the visual or aural carrier is missing. The relay contacts are wired to the REMOTE connector, as shown in Fig. 2-12. Pins 8 and 9 close for an alarm, and pins 7 and 8 are open for an alarm. The relay contacts are rated for maximums of 28 volts and 3 amperes.

The relay is energized with normal operation. Therefore, the alarm will also indicate that the instrument power has been shut off inadvertently, or that the mains power has failed (assuming an independent power source for the alarm).

Wiring the REMOTE Connector. To wire the external REMOTE connector, the connector must first be disassembled. See Fig. 2-13. Back the hold-down screws into the clamps about three turns (enough to clear the connector body plate). Remove the clamps. Separate the connector body and hood. Feed the wires through the neck of the hood and solder to the appropriate pins on the connector body. Fit the hood over the connector body and replace the clamps. Tighten the neck screws on the hood for a firm fit around the wire cable. Attach the assembled connector to the rear-panel REMOTE connector, and screw in the hold-down screws through the clamps and into the rear-panel standoffs.

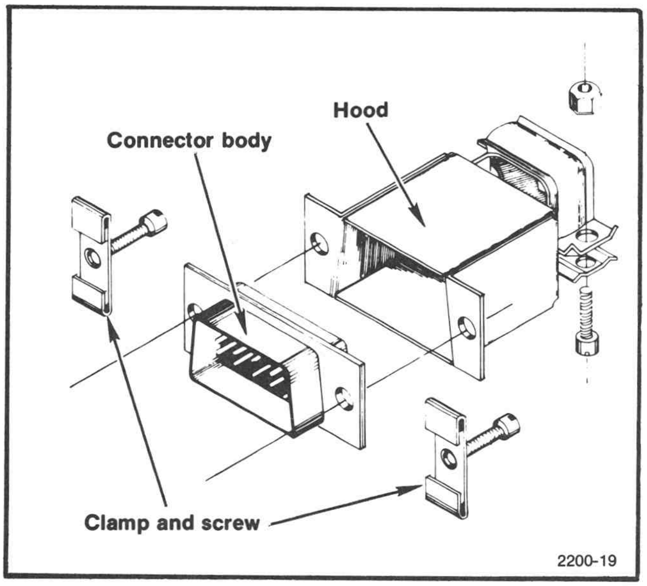


Fig. 2-13. Exploded View of REMOTE Connector.

MECHANICAL INSTALLATION

Latching

The 1450-1 incorporates a spring-latch design built into the rack handle. To release, grasp the handles, press the latch knobs toward the center of the instrument, and pull the 1450-1 forward. To re-latch, push the 1450-1 in until the spring-latches catch.

Thumbscrews

If additional latch strength is needed, the front castings have mounting holes for thumbscrew hold-downs (not supplied with the 1450-1). To gain access to these mounting holes, remove the cover plates under each handle by removing the two screws holding each assembly on. Remove the cover plates and re-install the handles with these same screws. See Fig. 2-14 for mounting hole details.

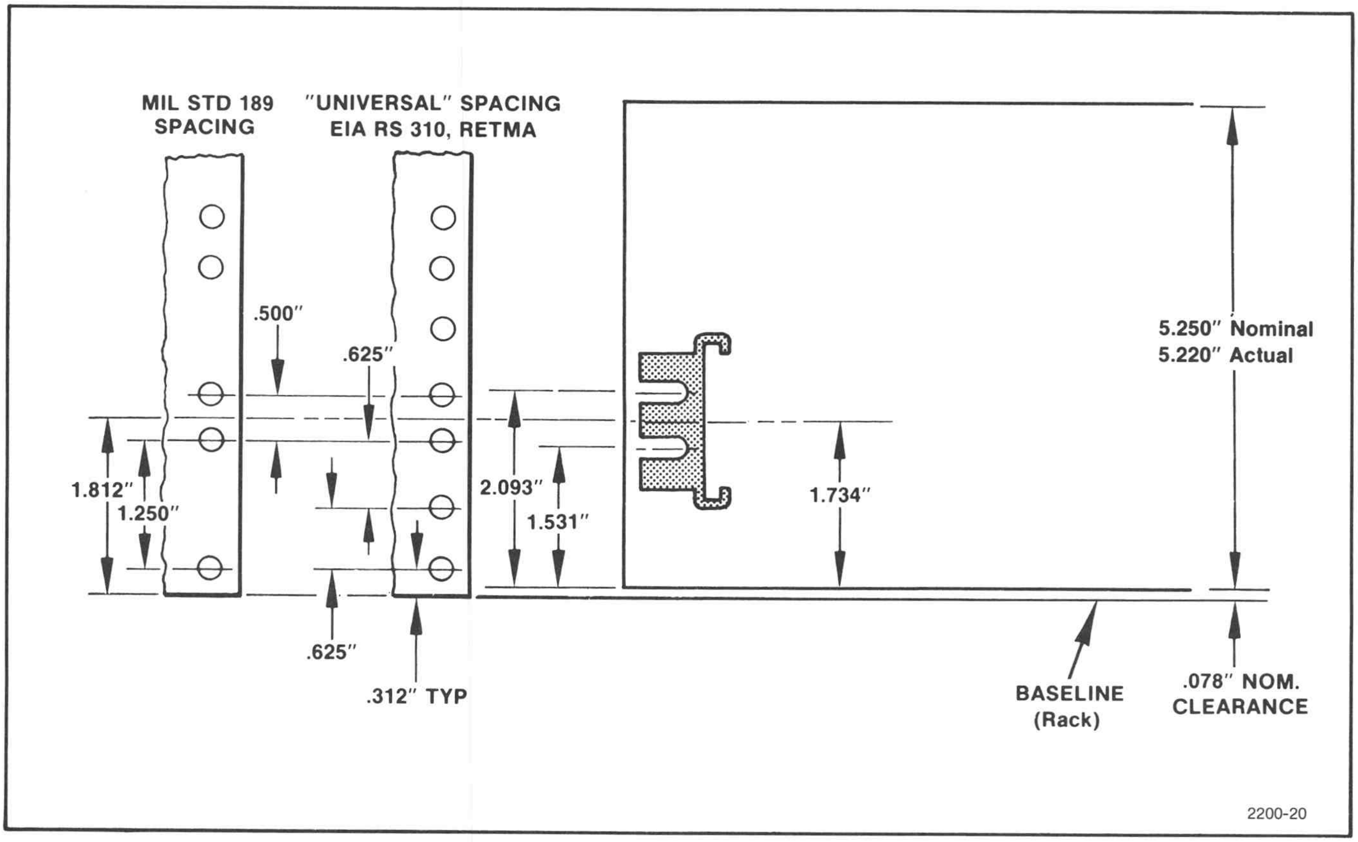


Fig. 2-14. Rackmount Hole Spacing.

NOTE

Because of the spring-latch feature, the 1450-1 cannot be racked in already installed stationary slide sections unless thumbscrew hold-downs are used. The slide tracks supplied with the 1450-1 are required to accommodate the spring latches. The new slides provide a cut-out in the stationary section to catch the shoulder of the spring-latch. See Fig. 2-15.

Rackmounting

The 1450-1 will fit most commercial consoles and 19-inch wide racks whose rail holes conform to universal spacing. See Fig. 2-14 for hole spacing details.

Allow at least two inches of clearance between the 1450-1 rear panel and the rack enclosure to ensure an adequate supply of cooling air.

The slide-out tracks mount easily to the rack front and rear vertical mounting rails if the inside distance between the rails is within 10 1/2 to 24 1/2 inches.

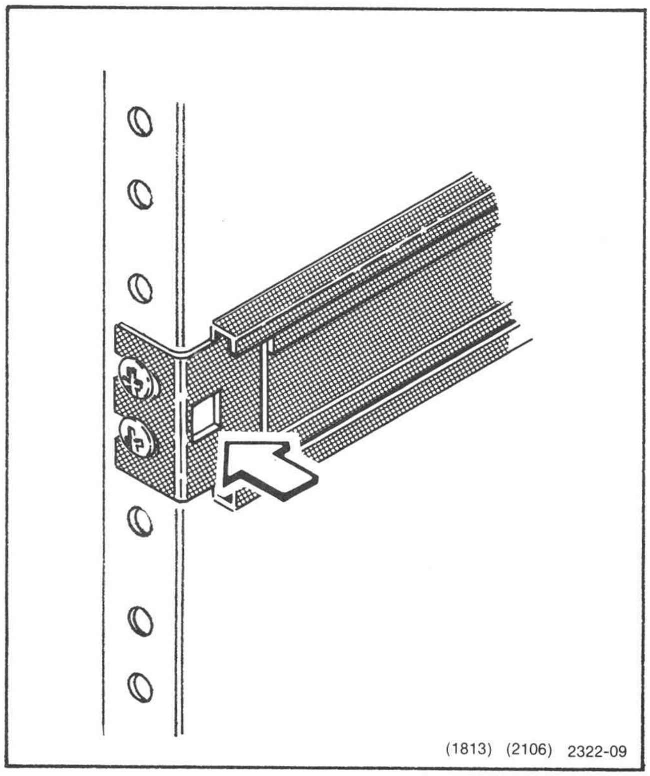


Fig. 2-15. Spring Latch Catch.

If the tracks are going to be installed in a rack whose inside dimension is not within 10 1/2 and 24 1/2 inches, some means of support (for example, extensions to the rear mounting brackets) is needed for the rear ends of the slide-out tracks.

The 1450-1 is 5 1/4 inches high, a multiple of 1.75 inches (the standard rack spacing). As long as the 1450-1 is positioned in the rack some multiple of 1.75 inches from the bottom or top, all the holes should line up and no drilling will be necessary.

The dimension of the opening between front rack rails must be at least 17 5/8 inches in width. The front lip of the stationary-track section mounts in front of the rail. Use bar nuts behind untapped front rails. The front lip of the stationary-track section must mount in front of the front rail to allow the 1450-1 spring-latch to function properly.

The slide-out tracks consist of two assemblies, one for each side of the instrument. Each assembly consists of three sections. See Fig. 2-16. The stationary section of each track attaches to rack rails as illustrated in Fig. 2-17. The chassis section mounts on the instrument and is installed at the factory. The intermediate section fits between the other two sections, allowing the instrument to be fully extended out of the rack.

The stationary and intermediate sections for both sides are shipped as a matched set and should not be separated. The package includes matched sets for both sides, and mounting hardware. To identify the assemblies, note that the automatic latch and intermediate section stop are located near the top of the matched sets when properly mated to the chassis sections.

To mount the instrument in a rack, select the appropriate holes in the rack rail, using Fig. 2-14 as a guide.

Mount the stationary track sections to the front rack rails with pan head screws (and bar nuts) if the rails are not countersunk. Use flat head screws (and bar nuts) if the rails are countersunk.

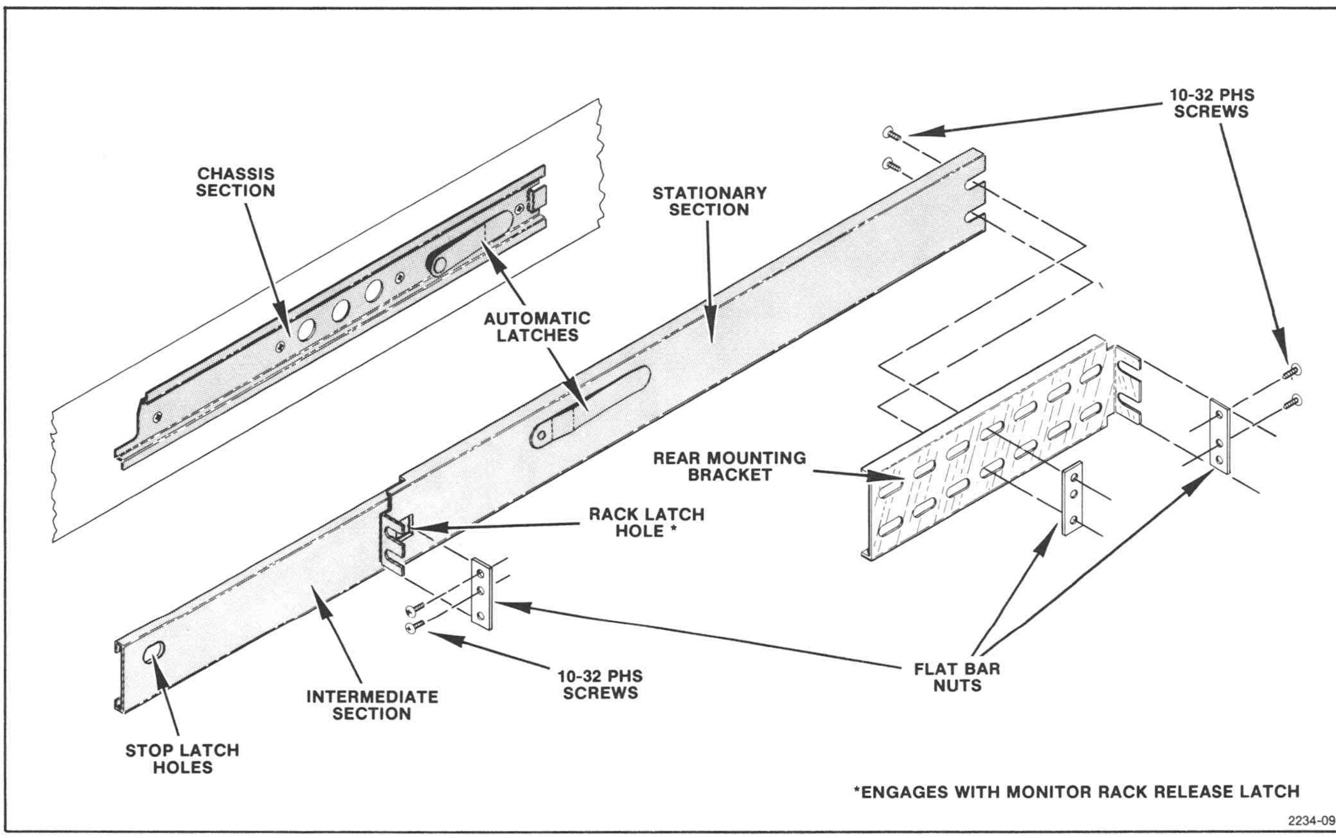


Fig. 2-16. Rackmounting Hardware.

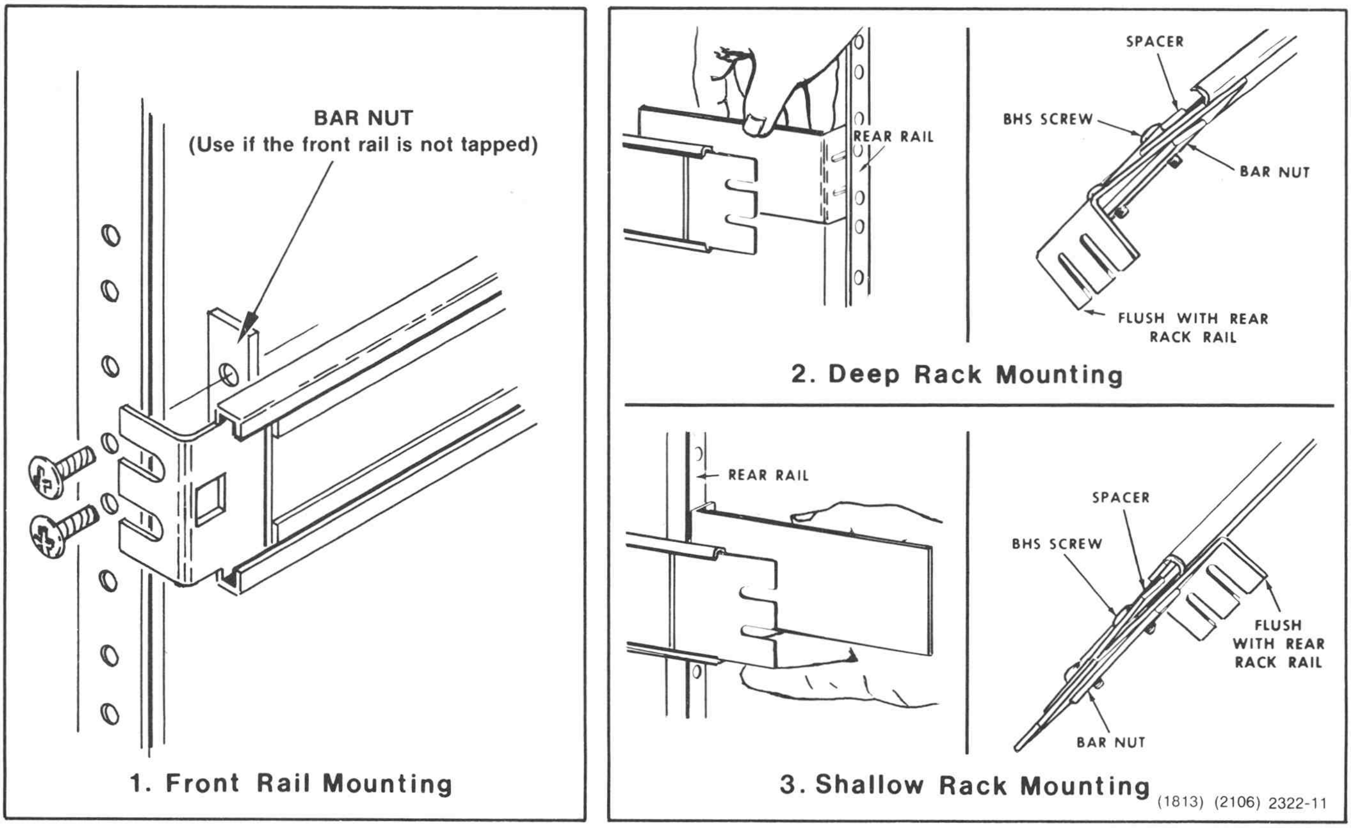


Fig. 2-17. Mounting Stationary Rackmount Sections.

Mount the stationary track sections to the rear rails, using one of the methods in Fig. 2-17. Note that the rear mounting bracket can be installed to fit either a deep or shallow cabinet rack.

After mounting the instrument in the slide-out tracks, adjust for proper width by loosening the front screws and allowing the slides to seek the proper width. Be sure that the instrument is centered, and re-tighten the screws.

When the instrument is pushed into the rack, an automatic spring-latch engages the back of the front rack rail to hold the instrument in place. To extend the instrument out of the rack, just press in the spring latch on each handle and pull the instrument out.

WARNING

THE FOLLOWING SERVICING INSTRUCTIONS ARE FOR USE BY QUALIFIED PERSONNEL ONLY. TO AVOID PERSONAL INJURY, DO NOT PERFORM ANY SERVICING OTHER THAN THAT CONTAINED IN OPERATING INSTRUCTIONS UNLESS YOU ARE QUALIFIED TO DO SO. REFER TO OPERATORS SAFETY SUMMARY AND SERVICE SAFETY SUMMARY PRIOR TO PERFORMING ANY SERVICE.

THEORY OF OPERATION

GENERAL CIRCUIT DESCRIPTION

Introduction

The 1450-1 is a television demodulator that converts the picture and sound carriers at an intermediate frequency (IF) to baseband video and audio signals. The demodulator is basically a multiple conversion, superheterodyne television receiver. Figure 3-1 shows a simplified block diagram.

A plug-in front end down converter is used to convert the radio frequency (RF) input signal to the first IF stage. Most gain control and amplification occurs in the down converter and first IF stages. The second IF stage provides precise Nyquist-slope filtering, using Surface Acoustic Wave (SAW) devices. This stage also provides the sound IF pick off, and establishes the zero carrier reference level for the picture signal.

The video detector is a product detector that may be used as either an envelope detector or a synchronous detector, depending on the source of the local oscillator (LO) signal driving it. A quadrature video detector provides an output that can be used to make transmitter incidental carrier phase modulation measurements.

The audio section uses a pulse count discriminator to linearly convert the FM sound signal to low distortion audio. Both Intercarrier and Split-sound modes are provided by selection of the local oscillator source to the first audio mixer.

The phase lock section produces a temperature-compensated IF reference frequency, a phase-locked LO source for the IF mixer, and LO sources for the aural mixer and the video detector.

The automatic gain control (AGC) section samples the level of the video output signal, and generates a digital control signal to address read only memories (ROM) that are programmed to operate positive intrinsic negative (PIN) diode attenuators in the down converter and first IF stages. A fine agc is also provided. The digital signal also controls the front-panel LED readout to indicate the input power.

RF SECTION

RF input signal levels from −69 dBm to −3 dBm can be fed to the input. For stronger signals, an attenuator in the mainframe extends the maximum input range (in 10 dB steps) to +27 dBm. The attenuator is a slab-line, thick-film device which, in addition to attenuation, provides a broadband 50 ohm load for the incoming signal and a 50 ohm source for the filter that follows.

From the input attenuator, the signal goes to a front-panel connector where it is patched to the RF Input of the down converter. The output of the down converter at the IF is similarly patched back to the mainframe front panel.

IF SECTION

First IF

The intermediate frequency of the down converter and mainframe may be 37.0 MHz (Option 1), 38.9 MHz (Option 2), or (most commonly) 45.75 MHz (Option 3). These frequencies correspond to the most popular IF frequencies for transmitters, and allow the 1450-1 to be used for testing the IF output of IF modulated transmitters.

The signal at the first IF stage goes through four amplifier stages, two gain control attenuators, and two bandpass filters. The amplifiers are operated at constant gain, while the signal level is varied by PIN-diode attenuators, controlled by the gain control section. The bandpass filters help reject unwanted signals while providing flat frequency response across the first IF passband.

24 MHz IF

The IF signal is converted to about 24 MHz. The IF converter mixer is a conventional ring diode mixer, with care taken to minimize feedthrough. Typically, the unwanted feedthrough is 60 dB down from the desired output signal.

The 24 MHz signal is filtered to remove extraneous mixer output signals. It then goes to the SAW filter preamplifier, and to a pick off amplifier to provide the Aural IF signal.

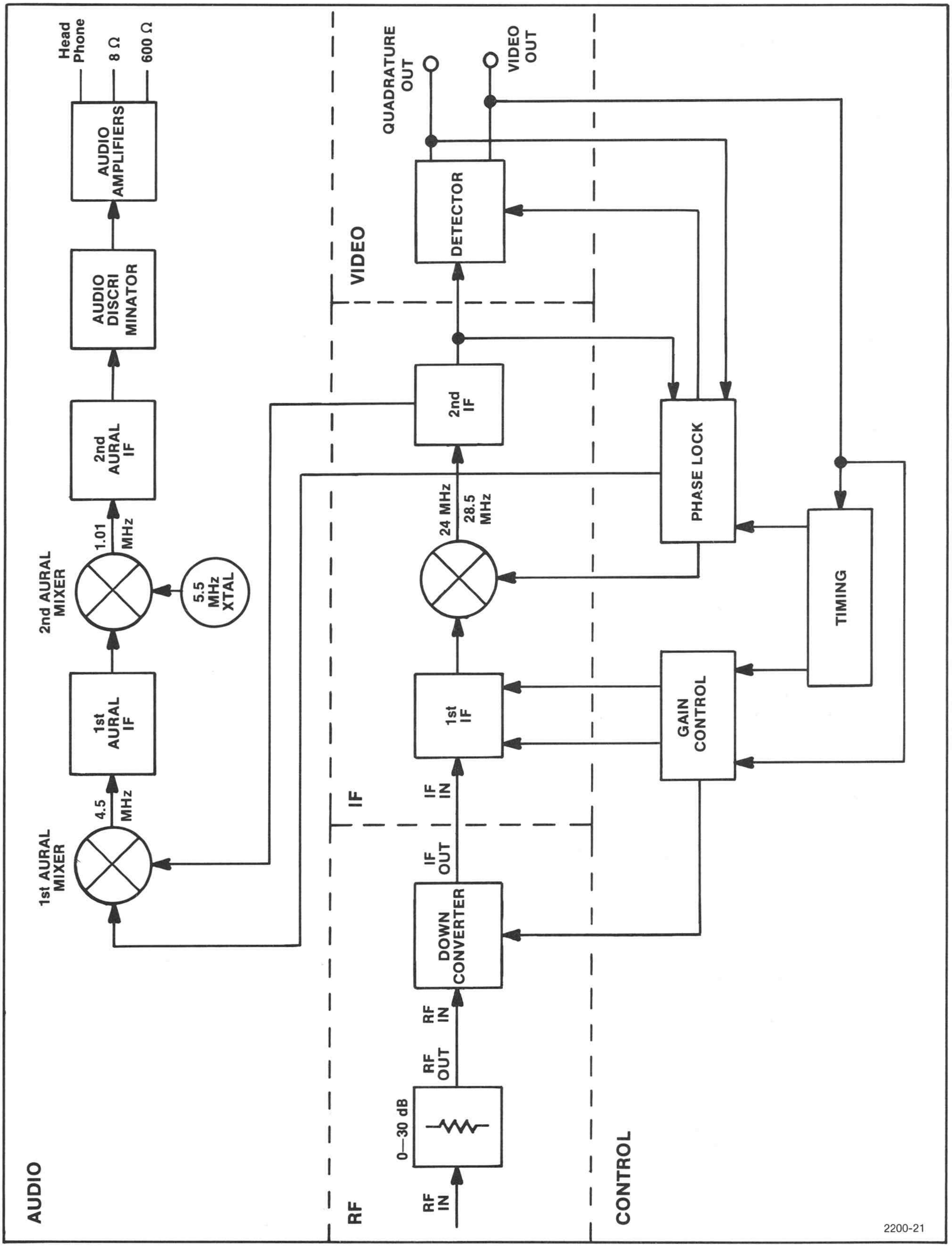


Fig. 3-1. 1450-1 Simplified Block Diagram.

SAW Filter

The 1450-1 uses SAW filters to obtain the precise Nyquist slope characteristics. Two SAW filters are used in the IF chain. A wideband unit is used for making out-of-service measurements with only the transmitter visual carrier on. A narrow band unit (which attenuates the aural carrier by greater than 55 dB) is used for making in-service measurements with the aural carrier also on.

SAW filters offer several advantages over discrete component designs. The desired bandpass characteristics are more easily achieved. The conventional all-pass sections required to correct the group envelope delay problems of an LC filter are not required, since the SAW filter design allows independent control of amplitude and phase characteristics. The filter requires much less space. There are no calibration adjustments. The filter characteristics do not change with mechanical or thermal shock.

While relative response characteristics of SAW filters remain constant with changes in temperature, the absolute frequency does not. A SAW filter is also difficult to drive. It requires low driving and load impedances (≈10 ohms) and has an insertion loss of about 30 dB. This insertion loss, and the fact that the ultimate out-of-band rejection desired is greater than 60 dB, means that at least 90 dB of isolation between input and output is required to achieve the desired performance.

The temperature induced change in operating point is compensated for by placing a temperature sensor near the filter to generate a correcting signal that shifts the 24-MHz intermediate frequency to track the filter. Extensive shielding at the input and output of the filter eliminates the undesired coupling. The 30 dB insertion loss requires the SAW filter preamplifier to be extremely linear to drive the SAW filter with a high level, intermodulation-free signal; and the post amplifier must have relatively low noise to prevent degrading the signal-to-noise ratio.

Zero Carrier Switch

The zero carrier reference level is established by opening the 24 MHz IF signal path with a diode switch during the zero carrier pulse time. This reduces the carrier by at least 50 dB, allowing a very accurate zero carrier reference.

The Synchronous Detector

The synchronous detector consists of two product detectors: one supplying the video output, the other the quadrature output. The IF signal to the video detector passes through a delay line of approximately 10 ns, which corresponds to 90 degrees of the 24 MHz IF. The IF signal to the quadrature detector, on the other hand, passes through a bandpass filter which has an equal 10 ns of delay at 24 MHz, but introduces no phase shift to the IF carrier. Thus, two broadband signals in time coherence but with phase quadrature are produced for detection by the product detectors.

The detector-amplifier combinations have a stringent stability requirement because the quadrature output is the control signal for the phase lock. Any errors in that signal, such as those caused by thermal drift, will cause the phase coherence between the IF signal and the reference LO to be in error. Since accurate phase measurements must be made and good transient response maintained, the phase error cannot be allowed to exceed 1 degree. This means the quiescent output of the quadrature detector-amplifier combination must not change by more than ±10 mV over the operating temperature range. This kind of performance is typically achieved only with chopper stabilization techniques.

In the 1450-1, the required stability is achieved with innovative circuit design. An integrated circuit doubly-balanced mixer is used as a current mode switching detector. The bias current of the IC is set up to change with temperature to maintain constant transconductance. The transconductance is stabilized if the dynamic emitter-resistances are held constant, which is done by allowing the emitter current to cancel out the effects of temperature.

The output amplifier that follows the detector is a feedback amplifier that terminates the low-pass filter, and drives the source terminated video and quadrature outputs.

Further, to insure that the potential stability is actually achieved, the instrument is subjected to temperature cycling in the calibration process, during which a single compensating resistor is selected and installed.

The same detector-amplifier circuitry used in the quadrature channel is also used in the video channel. As noted earlier, the video output signal is sampled and used as the control signal for the agc system. Any errors in its output will affect the video output amplitude stability of the instrument.

Envelope Detection

Envelope detection is accomplished by using the limiter signal as the LO for the video product detector. An advantage of this technique is to provide good linearity to low levels and thus permits accurate measurement of transmitter modulation depth.

AUDIO SYSTEM

The audio section has a wide bandwidth, a high signal-to-noise ratio, and low distortion; allowing the broadcaster to make critical measurements of the aural transmitter.

The 28.5 MHz aural IF carrier is converted to 4.5 MHz using either the 24 MHz phase lock reference oscillator (Split mode), or the limiter output (Intercarrier mode), as the first LO. The 4.5 MHz signal is amplified and filtered, then converted to 1 MHz using a 5.5 MHz crystal oscillator for the second LO. A limiter removes any amplitude variations, and the 1 MHz signal is then demodulated, using a pulse count discriminator.

The pulse count discriminator is operated at 1 MHz to increase the available output signal, thereby improving the signal-to-noise ratio over the same circuit operating at 4.5 MHz. The discriminator puts out pulses of constant amplitude and duration, whose repetition rate varies with the modulating frequency. The discriminator is an FM detector that exhibits high linearity and is the main factor in achieving the low maximum harmonic distortion specification.

Multiple audio outputs are provided, including 600 ohm balanced line, 8 ohm speaker, and front panel headphone jack. Other outputs include an aural alarm to indicate loss of the aural carrier, a calibrated deviation output, and a 4.5 MHz aural intercarrier output.

GAIN CONTROL SECTION

The IF circuitry must handle a wide range of input signal levels (−20 dBm to −64 dBm) and yet maintain a constant bandpass. This is accomplished by operating the amplifiers at a constant gain and providing gain control with variable attenuation between stages. PIN diode attenuators similar to that used in the down converter are located ahead of the second and third IF amplifiers, and provide up to 43.7 dB of gain control range. (The attenuator in the down converter adds another 21.7 dB of attenuation, and the fine gain control fills in between steps with 0.7 dB, for a total agc range of 66 dB.)

The 1450-1 provides a calibrated digital readout of the input power level with an accuracy of ±1 dB and a resolution of ±0.1 dB. Accordingly, the currents in the attenuator diodes must be set precisely, and differences in diode characteristics must be compensated for. Adjustments are accomplished through digital control of the diode currents. During the calibration process, each attenuator is characterized and the respective values are digitized and burned into Programmable Read Only Memories (PROMs). The PROMs then control digital to analog converters (DAC) that generate the required diode currents.

Selection of agc, and selection of the agc reference-level (back porch or sync tip) are accomplished by means of front panel controls. For agc, the video output level is sampled at the selected time and applied to a tracking analog-to-digital converter (ADC). The output of the ADC drives a decoder, which in turn sequentially controls the PIN diode attenuators via PROMs and the DAC. The attenuators are controlled sequentially in order to optimize the system signal-to-noise ratio at any particular setting. Fine agc is applied to the IF Post Amplifier to fill in the 0.7 dB steps of the PIN diode attenuators.

The speed of the agc loop can also be set by a front panel control to allow the operator to either observe (SLOW mode), or eliminate (FAST mode), variations in input signal levels, such as hum modulation or airplane flutter.

The agc circuitry also supplies control signals to actuate alarms in case of loss of the visual or aural carrier.

TIMING SECTION

This section supplies timing pulses corresponding to the back porch and sync tip times for use in the agc and phase lock sampling circuits. Zero carrier timing pulses are also generated by this section.

PHASE LOCK SECTION

This section provides a phase locked LO source for the IF mixer, and LO sources for the aural mixer and video detector.

The reference LO, through calibration and temperature compensation, is kept at exactly the frequency that the incoming IF signal must be converted to pass through the SAW filter properly. The limiter output, because it is the same frequency as the converted IF signal, is then compared to the reference LO by the converter phase lock circuitry. Any frequency difference between the two signals is representative of the frequency shift that must be obtained from the converter LO to bring the converted IF signal "on frequency".

Converter and Reference Local Oscillators

The voltage-controlled oscillators (VCO) for the converter LO and the reference LO meet two conflicting requirements: low phase noise generation and a wide

 @

frequency range capability. Phase noise must be low because any phase variations in these oscillators are added directly to the overall detected signals. This could obscure the phase measurements that the 1450-1 can provide. Wide pull in range is needed to accommodate the ±100 kHz variation in the incoming IF, and also to thermally track the SAW filter.

The converter LO and the reference LO are of similar design. Both are composite oscillators, combining the low phase noise of a crystal controlled oscillator with the wide frequency range of an LC oscillator.

In both cases, the VCO output is compared to that of a crystal oscillator, and the resulting difference is converted to a linearly proportional signal by a pulse count discriminator. This signal is compared to the input control signal and the resulting difference is used to control the VCO. Thus, the VCO frequency is linearly proportional to the control signal, and most VCO noise is adjusted out.

The frequency lock circuitry of the reference VCO also accepts a correction signal from a temperature sensor to allow for temperature tracking of the SAW filter characteristics.

Limiter

This stage picks off the IF signal and amplifies it through limiting amplifiers to remove any amplitude variations. The limiter output serves as the LO source for the video detector in the envelope detection mode, and for the first aural mixer in the Intercarrier sound detection mode.

The limiter has some stringent requirements. It must accomodate a wide range of signal levels (up to 40 dB with modulation), yet introduce less than one degree of phase shift, at about 24 MHz.

Four differential amplifier stages provide a total gain of 60 dB. Adjustable current sources for the amplifiers provide a delay versus amplitude adjustment mechanism for the limiter.

Phase Shifter

The frequency lock system does not have the capability of responding to fast phase disturbances in the incoming RF signal. The reference LO converter LO phase lock must work through the SAW filter, which has about 7 microseconds of delay. This limits the rate at which corrections can be applied to that loop.

This difficulty is overcome by providing a method of shifting the phase of the reference LO before it is used to synchronously detect the visual IF signal. Absence of delay or storage elements in this control loop allow the phase to be changed as rapidly as desired.

The response time of the reference LO phase control loop is made selectable so that phase errors in the incoming signal can be displayed and measured (SLOW mode) or tracked out and either eliminated or reduced (FAST mode).

The correction signal for the phase shifter is derived by sampling the output of the quadrature detector during some "resting time", such as back porch or sync tip (front panel selectable). Since the output of the quadrature detector should be zero at those times, it can be used as the control signal for the phase shifter. (A continuous mode of correction is also available by front panel selection, if desired.) The control loop will adjust the phase of the reference LO to make the output voltage of the quadrature detector zero at the selected time.

The correction voltage from the quadrature output is shaped by diode matrices into sine and cosine functions and applied to two mixers, driven 90 degrees apart by the 24-MHz reference oscillator. The outputs of the two mixers are combined to give a constant amplitude sine wave whose phase can be shifted linearly with voltage. The bandwidth of this system is such that corrections can be made at a television line rate, which is actually a limit imposed by the sampling of the reference time (sync tip or back porch).

MECHANICAL DESIGN

Small circuit boards housed in extruded aluminum compartments comprise the major circuitry. The compartments provide essential shielding between the many oscillators and the sensitive circuitry. Individual covers for the compartments give maximum isolation. Interconnection between circuit boards is accomplished with interface boards and a few rigid coaxial lines. Easy access to components is provided by use of a circuit board extender.

DETAILED CIRCUIT DESCRIPTION

Introduction

Use the following discussion along with the schematic diagrams to understand the operation of the 1450-1 Demodulator.

IF INPUT ⟨1⟩

IF Filter Amplifier Board (A20)

This board provides rejection of unwanted signals, and about 21 dB of power gain for the IF input signal from the down converter or other intermediate frequency (IF) source. The circuits on this board include an input amplifier, a bandpass filter, and an output amplifier. The amplifiers provide good source and load terminations, as well as amplification.

The signal from the IF INPUT connector drives the board at pin 2. For instruments B010120 and up, high frequency mixer products from the down converter are terminated by R28B through C28B (these components are located on the back of the circuit board). The IF signal drives one winding of T18, which is part of a feedback circuit around Q16. Transistor Q16 operates as a low noise, grouned base, high linearity amplifier. The input impedance of Q16 is determined by R07, which is factory selected to provide 50 ohms at the IF INPUT connector. The resistance of R07, reflected through T18, determines the input impedance. The output from Q16 drives the emitter of Q04. Voltage gain is provided by grounded-base stages Q16 and Q04 due to the higher collector load impedance versus input impedance. A voltage gain of about 1.6 is provided from the input of L26 to the junction of T18 and R07, and about 1.6 from this point to the junction of L02 and C20. Thermistor RT12 provides gain compensation with temperature. Parasitic oscillations are prevented by LR13. Input impedance to the bandpass filter is approximately 50 ohms, determined by R02, R03, and RT12 reflected through T11, a nine to one impedance transformer.

The IF bandpass filter is essentially flat over the intermediate frequency range. Also included is a trap for the upper alternate (second adjacent) channel video radio frequency carrier. This carrier is located at the low end of the IF passband due to frequency inversion in the down converter. During calibration, capacitors are connected across the inductors via the terminals shown. These capacitors form resonant circuits, allowing the inductors to be adjusted to the correct values.

The output load impedance for the filter is determined by the 1.5 dB, 50 ohm pad consisting of R66, R71, R72, R73 and the input impedance of Q72. Transistors Q72 and Q85 are identical in operation with Q16 and Q04.

Emitter follower Q47 supplies +3 Vdc to the bases of the four amplifier transistors.

Signals feed from the output of Q85 and T89 at 50 ohms impedance through a 50 ohm coaxial cable to the input of the first IF attenuator.

IF Attenuator-Amplifier Board (A21) (B010120 and up)

This board takes the signal from the IF Filter Amp board (A20) and feeds it through a variable positive-intrinsic-negative PIN diode attenuator for up to 21.7 dB of gain control, and then through an amplifier with a constant gain of about 22 dB.

This attenuator is configured as a bridged T network, with CR86 as the series PIN diode attenuator and CR96 and CR98 as the shunt diode elements. See Fig. 3-2. To decrease the IF signal attenuation, the series current through CR86 increases, and the shunt current through CR96 and CR98 decreases. This action reduces the series resistance of CR86, and increases the resistance of CR96 and CR98.

The overall effect increases the signal to the base of Q75, while maintaining a constant 50 ohm impedance at the attenuator input. For increased attenuation, more signal current shunts to ground and less is passed through the series elements. Inductors L75, L76, and L98 supply control current while preventing the signal current from passing to ground.

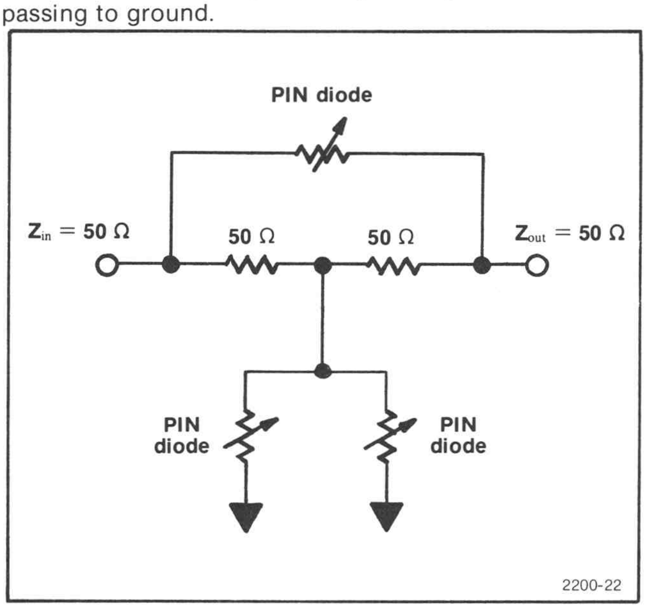


Fig. 3-2. Equivalent Circuit of Bridged Tee PIN Attenuator.

@

Transistors Q75 and Q62 form an operational amplifier. The input impedance at the base of Q75 is a virtual ground. Ac feedback takes place from the emitter of Q62 to the base of Q75 through R63 and C67. Potentiometer R62 sets the gain of the amplifier, while R46 sets the dc bias for optimum linearity. The voltage gain to the emitter of Q75 is determined by the ratio R63/R84. The voltage across R63, R65, R62, and R54 determines the emitter current for Q62. This current developes a voltage across the collector load (R61) for Q62. The voltage gain to this point is about 22.

The signal output is taken from the collector of Q62 through E42, a ferrite bead parasitic suppressor. Transistors Q42 and Q31 provide current gain for the IF signal, and lower the output impedance to a few ohms. The output passes to the next attenuator and amplifier through R27 and C37.

The output impedance is set at 50 ohms by R27. The overall stage gain is about 22 dB.

For instruments below serial number B010214, overdrive circuitry is included on this board (for later instruments this function is located on the AGC Logic board, A60). Under overdrive conditions, this circuitry provides a positive control signal to the agc circuit to counteract the effect of an overloaded stage between this stage and the video output. Potentiometer R01 is adjusted to forward-bias Q05. This turns Q07 on, which causes a low-level signal, near ground, at the collector of Q07. Should the composite IF signal exceed the predetermined level, CR14 conducts, turning Q05 off. Transistor Q07 is also turned off; the collector goes high, increasing attenuation via the agc voltage.

IF Attenuator-Amplifier Board (A21) (B000100-B010119)

This board takes the signal from the IF Filter Amp board (A20) and feeds it through a variable PIN diode attenuator for up to 21.7 dB of gain control, and then through an amplifier with a constant gain of about 20 dB.

This attenuator is configured as a bridged T network with CR86 as the series PIN diode attenuator and CR76 and CR77 as the shunt diode elements. See Fig. 3-2. To decrease the IF signal attenuation, the series current through CR86 increases, and the shunt current through CR76 and CR77 decreases. This action reduces the series resistance of CR86, and increases the resistance of CR76 and CR77.

The overall effect increases the signal to the base of Q75 while maintaining a constant 50 ohm impedance at the attenuator input. For increased attenuation, more signal current shunts to ground and less is passed through the series elements. Inductors L75, L76, and L98 supply control current while preventing the signal-current from passing to ground.

Transistors Q75 and Q62 form an operational amplifier. The input impedance at the base of Q75 is a virtual ground. Ac feedback takes place from the emitter of Q62 to the base of Q75 through R63 and C67. Potentiometer R51 sets the gain of the amplifier, while R46 sets the dc bias for optimum linearity. The voltage gain to the emitter of Q75 is determined by the ratio R55/R84. The voltage across R55, R64, R51, and R41 determines the emitter current for Q62. This current developes a voltage across the collector load (R52) for Q62. The voltage gain to this point is about 22.

The signal output is taken from the collector of Q62 through E42, a ferrite bead parasitic suppressor. Transistors Q42 and Q31 provide current gain for the IF signal, and lower the output impedance to a few ohms. The output passes to the next attenuator and amplifier through R35 and C37.

The output impedance is set at 50 ohms by R35. The overall stage gain is about 22 dB.

Under overdrive conditions, the overdrive circuitry provides a positive control signal to the agc circuit to counteract the effect of an overloaded stage between this stage and the video output. Potentiometer R01 is adjusted to forward bias Q05. This turns Q07 on, which causes a low level signal, near ground, at the collector of Q07. Should the composite IF signal exceed the predetermined level, CR14 conducts turning Q05 off. Transistor Q07 is also turned off; the collector goes high, increasing attenuation via the agc voltage.

IF MIXER and AURAL DRIVE ⟨2⟩

IF Attenuator-Mixer-Filter Board (A22) Option 1 & 2 (B010121 and up), Option 3 (B010402 and up)

The circuits on this board provide agc attenuation, two stages of amplification, and conversion to the second IF stage. This board has about 11 dB of loss with minimum attenuation, and about 33 dB loss with maximum attenuation.

The signal from the previous IF circuitry is applied through a PIN diode attenuator to the emitter of Q02. This attenuator operates in a similar manner as previously described under IF Attenuator-Amplifier board (A21). Diodes CR08 and CR09 are the shunt elements, and CR17 is the series element.

The amplifier composed of Q02 and Q23 operates in the same manner as the previously described IF amplifiers. The load impedance for Q23 is approximately 450 ohms, with RT22 providing temperature compensation for the stage gain.

The mixer input filter transforms the load impedance of Q23 to 50 ohms, and prevents harmonics generated in the IF amplifier from passing to the mixer thus generating spurious outputs. The filter also provides overall bandpass tilt adjustment for the IF stage.

The filter output goes through a 50 ohm 4 dB attenuator to provide a broadband 50 ohm load for the filter, and a broadband source for the mixer input, while isolating the two stages. Jumper P53 allows the filter output or the mixer input to be accessed for test and calibration purposes.

The local oscillator input at approximately +20 dBm, at a frequency equal to the first IF plus 24 MHz, is converted by T58 from an unbalanced 50 ohm input impedance to a balanced output, and applied to the mixer.

The mixer is a diode ring type using matched Schottky diodes. The high level local oscillator signal from T58 alternately switches alternate pairs of diodes on and off at the local oscillator rate. The first IF signal is fed via T54. The diode ring alternately grounds the secondary leads of T54 through T58 so that the sum and difference of the local oscillator frequency and the first IF are present at the center tap of the secondary of T54. The difference frequency is the 24 MHz second IF. The two input frequencies are reduced by the balanced action of the mixer. Figure 3-3 shows an example of diode ring mixer operation.

Mixer balance is optimized by adjusting R51 and C63. Either R52 or R53 may be selected or removed to help center the range of R51.

The output from the mixer is taken single ended at the wiper arm of R51. Resistor R62 terminates the mixer output and provides a 50 ohm reflected impedance at the mixer input. The signal through the attenuator drives the emitter of Q81. Transistors Q81 and Q84 form an IF amplifier, at 24 MHz, that is similar in operation to the IF amplifiers discussed previously.

IF Attenuator-Mixer-Filter Board (A22) Option 1 & 2 (B000100-B000120), Option 3 (B000100-B010401)

The circuits on this board provide agc attenuation, two stages of amplification, and conversion to the second IF. This board has about 11 dB of loss with minimum attenuation, and about 33 dB loss with maximum attenuation.

The signal from the previous IF circuitry is applied through a PIN diode attenuator to the emitter of Q02. This attenuator operates in a similar manner as previously described under IF Attenuator-Amplifier Board (A21). Diodes CR08 and CR09 are the shunt elements, and CR17 is the series element.

The amplifier composed of Q02 and Q23 operates in the same manner as the previously described IF amplifiers. The load impedance for Q23 is approximately 450 ohms, with RT22 providing temperature compensation for the stage gain.

The mixer input filter transforms the load impedance of Q23 to 50 ohms, and prevents harmonics generated in the IF amplifier from passing to the mixer and generating spurious outputs. The filter also provides overall bandpass tilt adjustment for the IF.

The filter output goes through a 50 ohm 4 dB attenuator to provide a broadband 50 ohm load for the filter, and a broadband source for the mixer input, while isolating the two stages. Jumper P53 allows the filter output or the mixer input to be accessed for test and calibration purposes.

The local oscillator input at approximately +20 dBm, and at a frequency equal to the first IF plus 24 MHz, is converted by T48 from an unbalanced 50 ohm input impedance to a balanced output, and applied to the mixer.

The mixer is a diode ring type using matched Schottky diodes. The high level local oscillator signal from T48 alternately switches alternate pairs of diodes on and off at the local oscillator rate. The first IF signal is fed via T54. The diode ring alternately grounds the secondary leads of T54 through T48 so that the sum and difference of the local oscillator frequency and the first IF are present at the center tap of T54's secondary. The difference frequency is the 24 MHz second IF. The two input frequencies are reduced by the balanced action of the mixer. Figure 3-3 shows an example of diode ring mixer operation.

The output from the mixer is taken single ended at the center tap of the secondary of T54 and fed through a 1.5 dB attenuator to terminate the mixer output and to provide a 50 ohm reflected impedance at the mixer input. The signal through the attenuator drives the emitter of Q71. Transistors Q71 and Q74 form an IF amplifier at 24 MHz that is similar in operation to the IF amplifiers discussed previously.

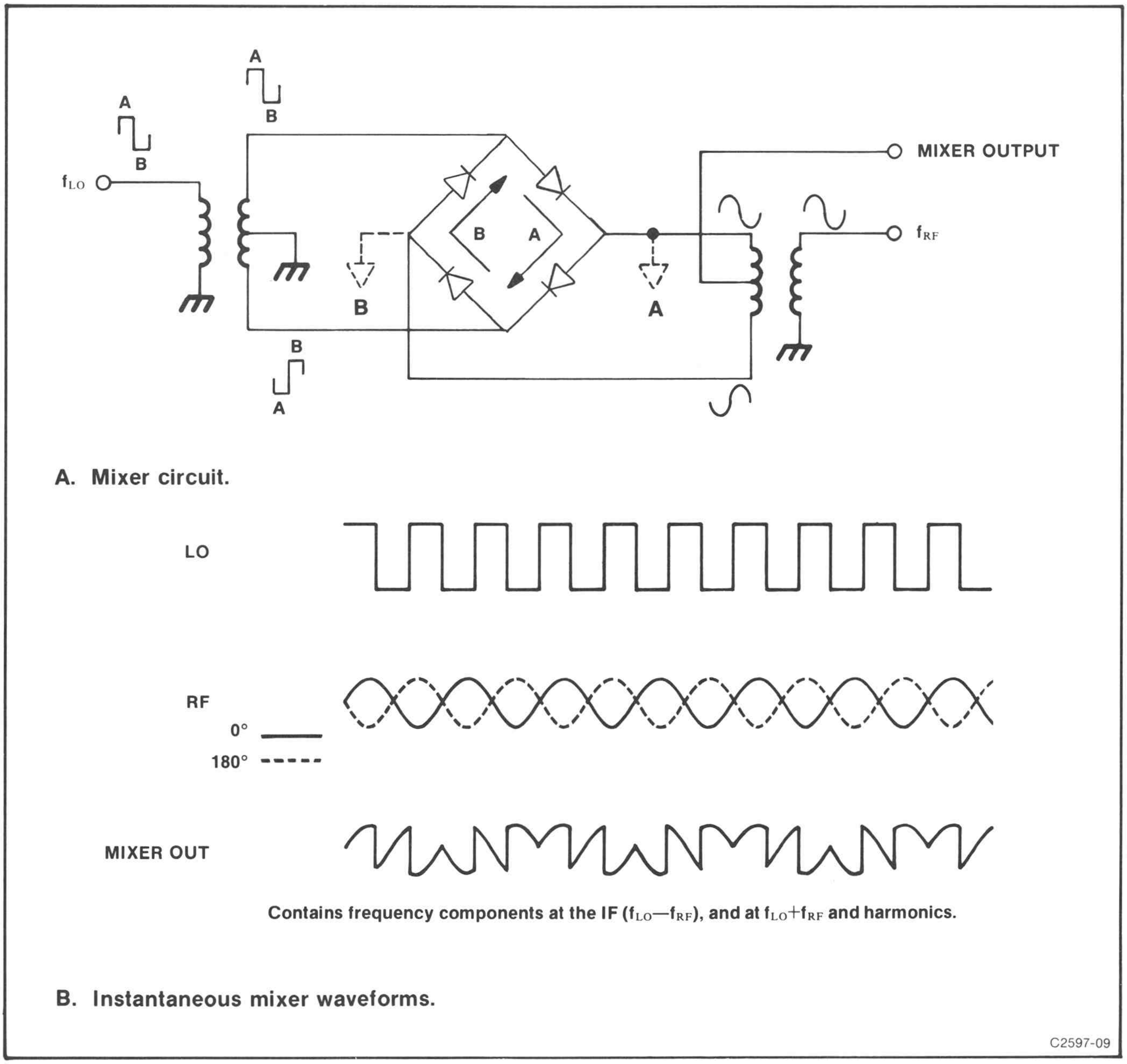


Fig. 3-3. Diode Ring Mixer Operation.

IF Switch-Aural Drive Board (A23)

This board adds further selectivity to the IF system. It provides an IF signal to drive the audio circuitry, and a diode-switch circuit to switch the IF signal to either the wide band or narrow band Surface Acoustic Wave (SAW) filters. The board has about 10 dB of loss.

Output from the previous amplifier feeds through a 50 ohm coaxial cable to a 4 dB pad composed of R64, R65 and R66. This pad provides a stable source impedance for the 24 MHz bandpass filter. The 24 MHz bandpass filter rejects undesired mixing products and supplements the SAW filter. The 24 MHz bandpass filter has about 1 dB of insertion loss.

The aural signal is taken from the junction of C71 and R82, and fed to the base of Q13. This transistor and Q17 form an operational amplifier with the output taken from the collector of Q17. Feedback occurs through C15 and R24. The output to the audio mixer is taken from transformer T29.

The video IF signal from the 24 MHz bandpass filter feeds through a 4 dB pad composed of R81, R82, and R83 to a switch that selects the narrow or wide band SAW filters. This pad provides a stable output termination for the 24 MHz bandpass filter.

The front panel SOUND TRAP IN button selects input to the narrow band SAW Filter. Under these conditions, −15 V is applied to R78. This action forward biases CR95, and back biases CR94 and CR97, preventing any IF signal from passing to the wide band filter. Diodes CR84 and CR88 are forward biased and CR83 is back biased. This allows the IF signal to pass to the narrow band filter.

When the SOUND TRAP OUT button is pressed, +15 V is applied to R78. This voltage back biases CR84, CR88 and CR95 and forward biases CR83, CR94, and CR97. This opens the narrow band signal path, shorts to ground the input to the narrow band filter, and allows the signal to pass to the wide band filter through the appropriate diodes.

IF NYQUIST FILTERING ⟨3⟩

IF SAW Amplifier Boards (A24 and A25)

These boards precisely shape the IF bandpass, and add additional selectivity. This filtering is accomplished by SAW filters. The narrow band SAW filter (SOUND TRAP IN) is located on A24, and the wide band SAW filter (SOUND TRAP OUT) is located on A25. Each SAW filter has about 30 dB of insertion loss, and the Nyquist slope places the 24 MHz visual IF down another 6 dB. The amplifier on the board has about 30 dB of gain, giving a stage gain of 0 dB in the middle of the passband and −6 dB at the 24 MHz visual IF.

The IF frequency passes to the wide or narrow band SAW filter as selected. The filter circuits are identical to each other except for the frequency response of the SAW filter elements and several minor component value changes. SAW filters are piezoelectric crystals through which electrical signals are converted into surface acoustic waves. They are relatively small devices and require no tuning or maintenance. Their bandpass and group delay characteristics are very precise. Figure 3-4 shows the typical bandpass characteristics of the SAW filters.

Transistors Q97 and Q85 form operational amplifiers. Feedback occurs through R93, the gain adjustment, and R97. The operating bias is set by R76. The wide or narrow band filter amplifier not used is biased off. When the narrow band filter is selected, R52 and the cathode of CR78 is at −15 V. Transistor Q52, located on the IF Interface board (A32), is off and CR78 on the narrow filter board, is conducting. With no emitter return path, Q97 and Q85 in the wide-band filter are inoperative. The switching line goes to +15 V if the sound trap is switched out. This opens the emitter return path for Q97 and Q85 in the narrow band filter and causes Q52 to conduct, thus providing an emitter return path for Q97 and Q85 in the wide band filter. Power to the unused amplifier is turned off, as just described, to improve the signal isolation through the switch and unused amplifier.

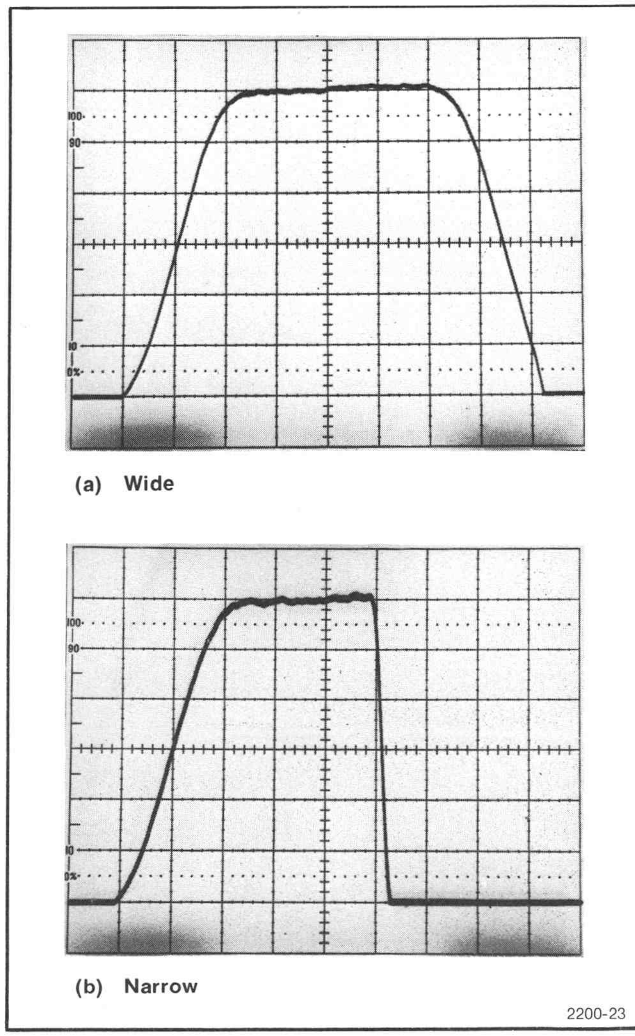


Fig. 3-4. Typical Bandpass Characteristics of the SAW Filters.

The output from these amplifiers is taken from the collector of Q85. The ac collector load, composed of C90 and R90, is test selected to obtain the correct SAW filter bandpass tilt. The signal feeds to a unity gain, low output-impedance, feedback amplifier composed of Q87 and Q71. The amplifier output voltage is doubled by transformer T55 and drives the SAW filter. The source impedance provided at the output of T55 is about 10 ohms. Adjustable inductor L52 neutralizes the input capacitance of the SAW filter.

The SAW filter passband shifts with temperature. Diode CR18 senses the temperature of the wide band SAW filter. The temperature coefficient of this diode is −2.2 mV/degree C. Temperature coefficient of the SAW filters is about −90 ppm/degree C. The diode voltage drop is sensed, and the frequency of the Converter Local Oscillator shifts to maintain the 24 MHz Visual IF signal precisely at the correct point on the Nyquist slope of the SAW filters.

IF Post Amplifier (A26)

This circuit amplifies the signal from either the wide or narrow band filter sufficiently to drive the next stages. The Post Amplifier output goes to the IF Zero Carrier-Phase Shifter board (A27), and also drives the Limiter board (A55). There is an analog gain control in this circuit, controlled by the fine agc circuit, that has about a ±0.7 dB range. The stage gain for this board is about 27 dB.

The wide band filter outputs to the emitter of Q13 and the narrow band to the emitter of Q23. These transistors operate as common base amplifiers with a current summing point and virtual ground at the junction of R21 and C22. The dual common base isolation stages prevent SAW filter bandpass characteristics from interacting with each other. Damping for spurious oscillations is accomplished by ferrite beads, E13 and E23, in the base circuits.

Transistors Q33 and Q53 form an operational amplifier with feedback through C52, R41 and R32. Gain for this amplifier is adjusted by R41. The operating point is adjusted by R64, which supplies emitter current to Q53. Ferrite bead E33 serves to suppress oscillations in this stage.

The fine automatic gain control inputs current at pin 5 from the Pin Drive Decoder on A60. This current varies the conduction of CR56, a PIN diode. With increasing current through CR56, R53 is effectively shunted for ac currents through C58 and C55. This increases the ac current through Q53 and consequently the gain of this stage. The PIN diode current path is through R58 to the −15 V supply. Transistors Q71 and Q81 operate in a similar manner to Q71 and Q82 located in the SAW drive amplifier on A24 and A25. Output is taken at a low impedance point at the collector of Q81. R87 and R96 provide 50 ohm source impedance, and feed the IF Zero Carrier/Phase Shift circuitry on A27, and the Limiter circuit on A55.

IF DETECTION ⟨4⟩

IF Zero Carrier Switch/Phase Shifter Board (A27)

This circuit provides a means of shutting off the IF signal to establish a zero carrier level for modulation percentage checks. Another part of this circuit splits the IF signal into two paths, phase shifts the two signals precisely by 90 degrees over the full bandwidth, and equalizes the delay between the two paths. One output feeds an in-phase 24 MHz IF signal to the video detector, and the other output feeds a quadrature phase 24 MHz IF signal to the quadrature detector. The output impedances are 100 ohms. The IF signal is reduced by about 14 dB between the input and each of the two outputs (into 100 ohms).

The IF signal is turned off during the time of the zero carrier pulse. The signal turning the carrier off comes from the Zero Carrier Timing circuitry shown on schematic 11. A TTL high is applied to the base of Q58 during zero carrier time, switching Q58 off. With Q58 off, the junction of R55, R66 and T65 goes negative, back-biasing diodes CR53, CR66, CR84 and CR85. This action prevents the IF signal from passing to T55 from T94. Potentiometer R72 adjusts current through both diode signal paths so that equal switching signals flow to both inputs of T55, minimizing switching transients. When off, this switch provides about 55 dB of signal isolation.

Delay is introduced by L89, C88, C95 and L98 and by networks directly supplying the IF signal to the video and quadrature detectors so that the signal supplied by the limiter, for envelope detection, arrives at the detectors at the same time.

Output from the zero carrier switch passes through a network composed of L48 and C55 to the video detector. This network provides a uniform 10 ns of delay to the video IF carrier and sidebands.

The output from the zero carrier switch is also fed to the quadrature detector through a network consisting of C31, L21, L25, C27, L13, C03, and C10. L13 is used as a coarse adjustment, and C10 is a fine adjustment that is accessible without using an extender board. This filter has a bandpass from about 22 MHz to 30 MHz with relatively flat amplitude response. The output from this filter, to the quadrature detector, is the carrier frequency delayed by 10 ns with no phase shift and sidebands that are shifted in phase depending on frequency.

The resulting signal outputs of both filters are identical in amplitude and shifted in phase by 90 degrees. The impedance looking into the detectors is approximately 100 ohms.

IF Detector/Video Amplifier Boards (A28 and A29)

These boards convert the 24 MHz IF signal to baseband signals, filter any unwanted outputs from the converter, and amplify the resulting signal. Circuit board A28 provides the quadrature signal to the phase-lock circuit and to the QUADRATURE OUTPUT port. Board A29 provides the video output signal to the AGC circuit and to the two VIDEO OUTPUT ports. Power gain of this stage is about 23 dB for 100 ohms input and 75 ohms output impedances. (If measured with 50 ohm source and load impedance test equipment, the apparent gain will be 0.7 dB less.)

As both detectors, with the exception of input phase and output signal, are identical the following discussion covers both circuits. Both detector circuits operate as product detectors, and provide envelope or synchronous detection depending on the signal driving the local oscillator source.

The signal from the limiter (envelope detection) or the local oscillator, controlled by the transmitted carrier (synchronous detection), is fed to the balanced demodulator, U14, through T27. See Fig. 3-5. Input impedance to T27 is about 100 ohms. The output of T27 drives U14.

The IF signal passes to the demodulator through transformer T09. Input balance for the demodulator is accomplished by R11 and associated components connected to −15 V. Pins 1 and 4 of U14 provide proper dc bias for the circuit. The output at pins 9 and 6 of the video detector is a full-wave rectified (envelope or synchronous) IF signal. The main signal components are baseband video and modulated 48 MHz. Transistors Q11 and Q20 operate in a grounded base mode, and are housed in a common heat sink for thermal compensation. They provide constant voltage at pins 9 and 6 of U14. This assures constant power dissipation so that U14 switches consistantly at the same point with respect to the driving waveforms.

Transistors Q21 and Q31 form a current mirror. Current flowing in the collector of Q31 is inverted by Q21 and added to the signal from pin 6. The result is a signal at the collector of Q20 with twice the amplitude of either signal at the output of U14. The emitter resistors, R40 and R43, of Q21 and Q31 are selected to compensate for any dc unbalance in the demodulator circuit due to temperature.

Output from the demodulator is fed to the low pass filter composed of L44, L54, and L64, along with associated capacitors. Inductor L64 and C66 form an all pass section, providing group delay compensation. The filter passes frequencies below about 10 MHz, but is phase equalized to about 15 MHz. The signal is amplified by Q71, Q81, Q83, and Q86. Transistors Q81, Q83, and Q86 form an operational amplifier. Transistor Q71 provides temperature compensation for Q81, which operates as a grounded-base stage. The collector of Q81 drives Q83, which drives emitter follower Q86. Feedback occurs through R83.

In the synchronous detection mode, the quadrature output signals, when terminated in 75 ohms, are 0 V at dc and up to 700 mV peak to peak for frequencies above about 1 MHz. The quadrature output is 0 V in the envelope detection mode. The video output signal, into 75 ohms, is about 1 V maximum with the blanking level at 0 V and zero

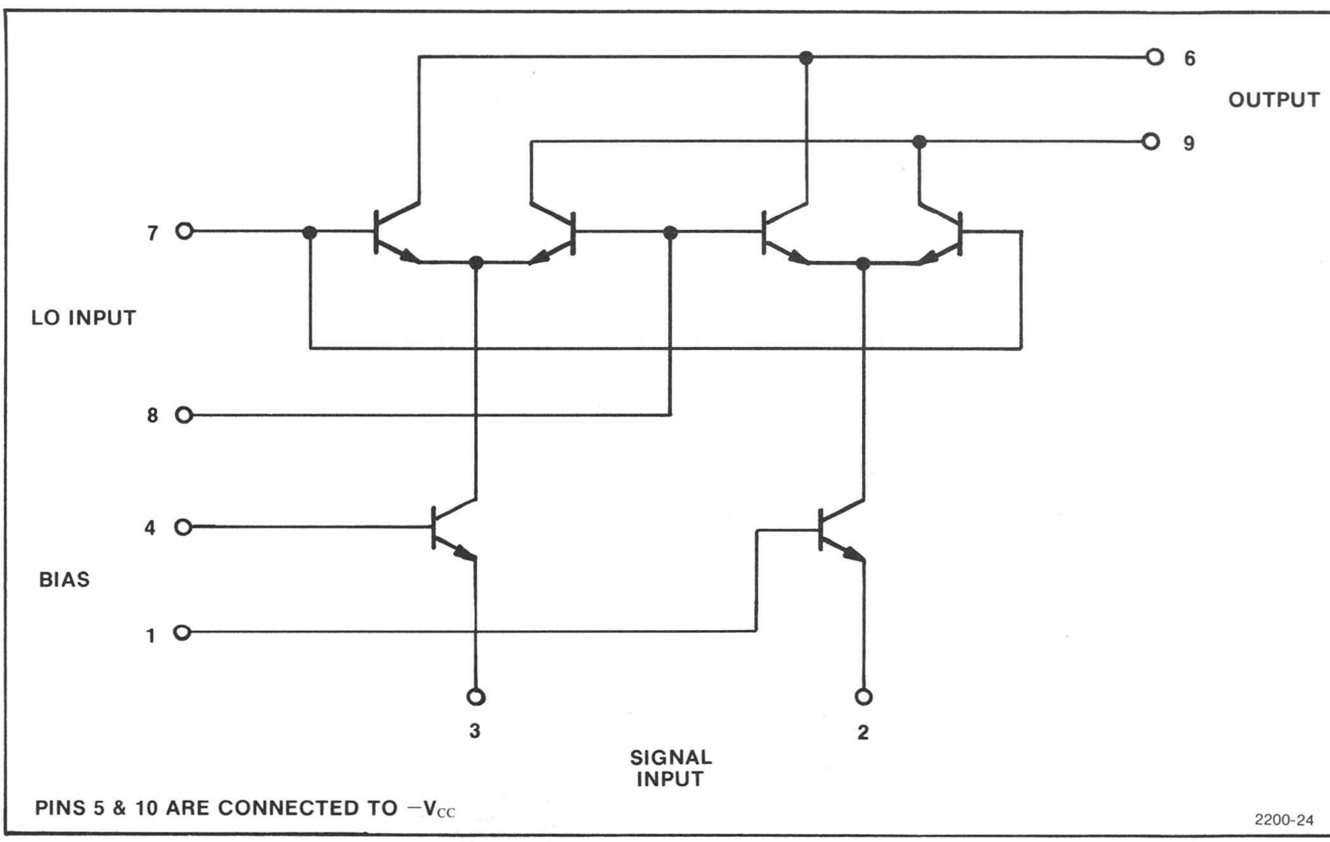


Fig. 3-5. Internal Schematic of the Balanced Demodulator IC as Used in the Video and Quadrature Detectors.

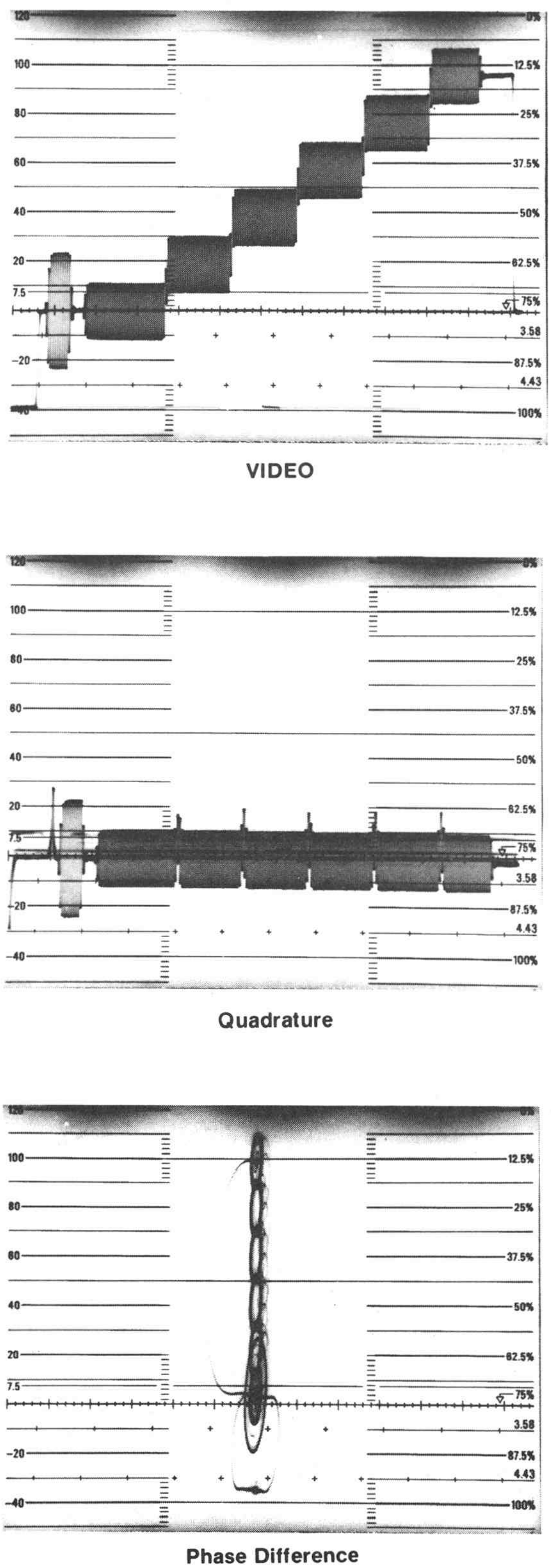


Fig. 3-6. Relationship of the Video and Quadrature Outputs.

carrier level at 0.857 V. See Fig. 3-6. As the boards are identical, placing the Quad-Video jumper in the respective position changes the dc level of the output amplifier, and makes these boards interchangeable for test and troubleshooting purposes.

PIN DRIVER ⟨5⟩ and ⟨5a⟩

General

The PIN Driver circuits (A30-A31) are controlled by the agc circuit, and set the currents that drive the PIN diode attenuators. The board input is a 5 bit parallel binary signal. Three Programmable Read Only Memories (PROM) transform the 5 bit input code into two 12 bit parallel binary signals that switch two sets of binary weighted current sources. The current sources drive the series and shunt diodes in the PIN diode attenuators on A21 and A22. (See Fig. 3-7.)

The desired effect is to have the PIN diode attenuator change its attenuation in equal steps when required by the agc. Nonlinearity of the PIN diodes is compensated for by programming the PROM outputs to switch the correct amount of current from the current sources to the attenuator. This results in 32 levels of attenuation that are separated by 0.7 dB each. To achieve this accuracy, the PROM must be specially programmed for the individual PIN diode characteristics. This is done by inserting a PROM simulator into the PROM sockets, determining the correct program for each step, and programming the PROM.

NOTE

To maintain the accuracy should a PIN diode or PROM fail, we recommend that the instrument be returned to Tektronix for repair and recalibration of this circuit. (See the Maintenance section of this manual for further information.)

PROM

The PIN Driver PROM (U44, U64, and U14) each have 256 memory locations. Each memory location may be programmed as a binary "1" or "0". The memory is formatted in 32 words (or bytes) of 8 bits each. The 5 bit input to the board is fed to address lines A0 through A4 of each PROM. All combinations of the input signal (2 to the 5th power) account for the 32 input address locations.

The memory of U64 is shared between U44 and U14 to get the 12 bit binary output required to drive the current sources. The shunt memory output consists of U44 (B0 through B7) and U64 (B0 through B3). The series memory output consists of U64 (B4 through B7) and U14 (B0

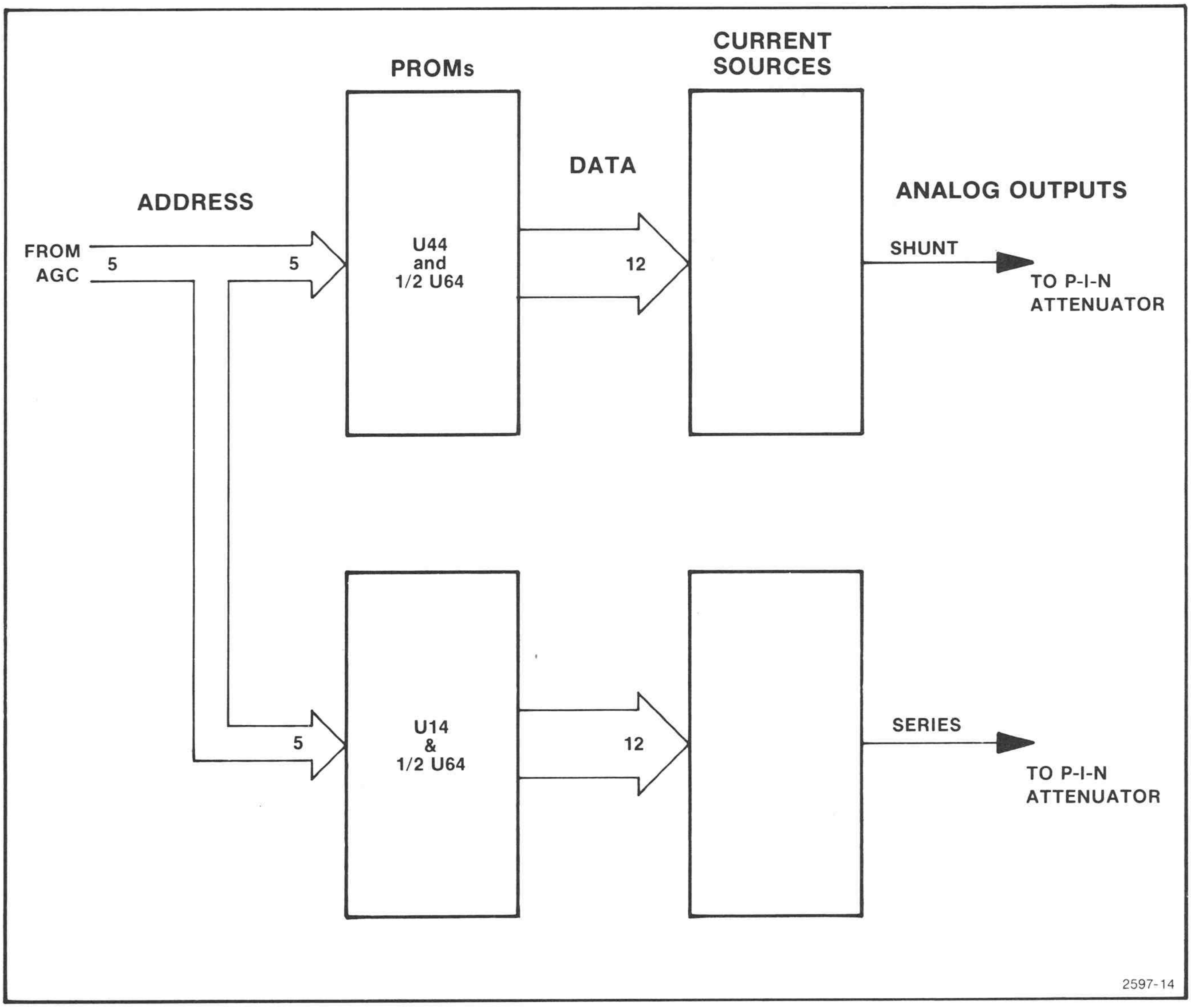


Fig. 3-7. PIN Driver Block Diagram.

through B7). This gives a possible 4096 (2 to the 12th power) output codes to choose from in programming the PROM to drive each of the current sources.

Current Sources (see Fig. 3-8)

There are two sets of current sources. They provide shunt and series currents for the RF PIN Attenuator (A3). The shunt sources are the upper row of transistors and resistors shown in the schematic. The series sources are shown in the lower row.

Resistors R93 and R92 form a voltage divider at the base of Q81. Transistor Q81 provides temperature compensation, and sets the level at the bases of all the current source transistors. When a current source is switched on, its emitter voltage is the same as that at the base of Q81. This makes the current through the transistors dependent upon the value of the emitter resistors. The collectors of each set of current source transistors are connected together, thus summing the currents at the outputs. The series current output is at P08-1, and the shunt current output is at P08-2.

The current sources are binary weighted. The smallest current available is from Q19 in the shunt circuit, and Q80 in the series circuit. This can be considered as a reference current (Ir) for this description. The smallest current source then supplies Ir x 1. The next larger current source supplies Ir x 2, the next Ir x 4, and so on. This progression of powers of 2 continues for the twelve current sources, so that the largest current available from a single source is Ir x 2048. If all current sources in one set were on at once, the total current available would be Ir x 4095. Therefore, there are 4096 (0 included) possible currents to choose from to drive the PIN Attenuator.

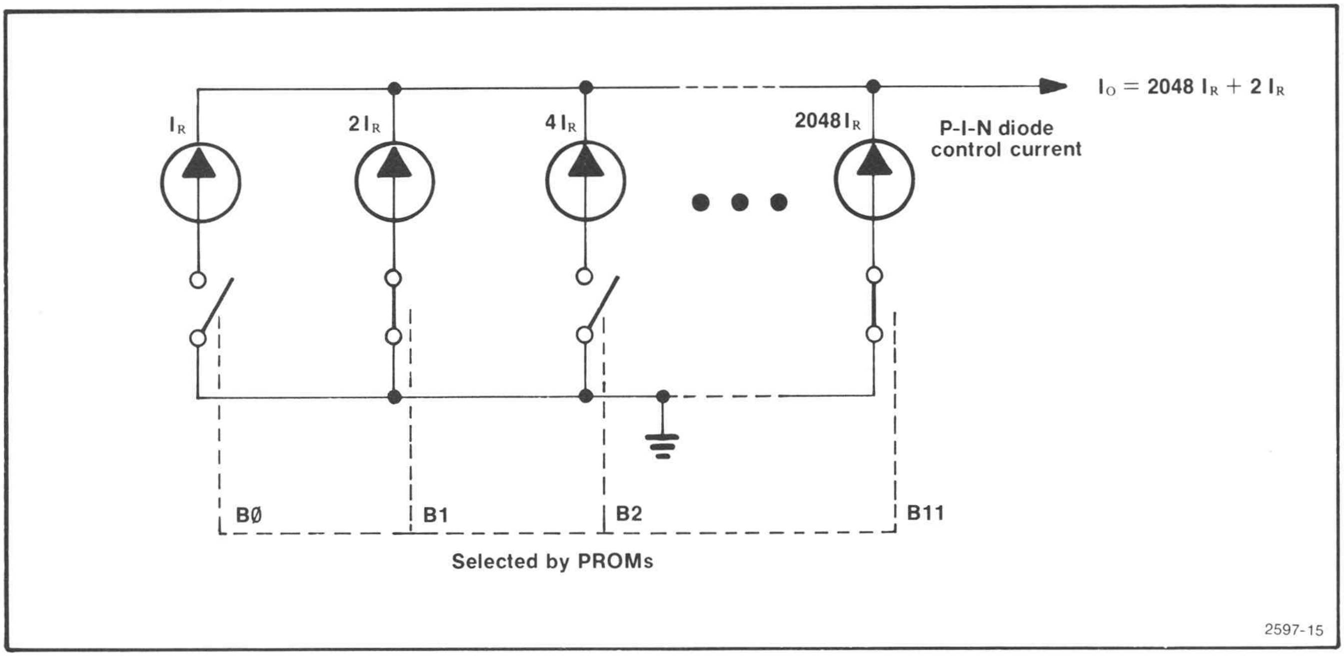


Fig. 3-8. Simplified Schematic of PIN Driver Current Sources.

The current sources are switched on when the corresponding PROM outputs are high. The high current sources, Q88 and Q10, are switched by transistors Q89 and Q00 respectively. When the PROM MSB (Most Significant Bit) is high, the current through the emitter resistor passes through the current source transistor to the output. When the MSB is low the source transistor is turned off, and the current is shunted by the switching transistor. This keeps a large amount of current from sinking in the PROM if all outputs should be low. The smaller value current sources are switched by diodes connected between the PROM and the current source emitters.

AUDIO INPUT ⑥

First Audio Mixer Board (A40)

This board converts the aural IF from about 28.5 MHz to 4.5 MHz. The board also allows switching between an external Aural Intercarrier signal and the internal 4.5 MHz aural IF, and provides a 28.5 MHz detector for an aural alarm circuit.

The IF signal is applied to the 28.5 MHz bandpass filter. This filter, tuned 4.5 MHz above the 24 MHz IF picture carrier, eliminates most of the video information present. After the filter the signal goes to the first audio mixer, and to the alarm circuitry.

Transistor Q74 amplifies the sound carrier to drive Q84; these transistors are configured as an operational amplifier. Transistor Q84 has a parallel tuned circuit as a collector load. If the aural carrier is present, the collector of Q84 develops a voltage which is rectified by CR96, causing a negative voltage to appear at pin 2 of U88. Amplifier U88 is biased by CR85 and zener diode VR98 so that the output at pin 6 is TTL compatible. The negative dc voltage at pin 2 of U88 causes the output (pin 6) to go high, which indicates to the alarm circuitry that an aural carrier is present. Should the carrier disappear pin 2 of U88 goes high, causing a low at pin 6 which activates the alarm circuitry.

The IF signal is applied to demodulator U12 through T31, which converts the single ended IF input to double ended output. Dc bias for the input of U12 is provided by R21 and R22. The local signal, either from the limiter (intercarrier) or the phase locked local oscillator (split), inputs at T19. This transformer provides single to double ended conversion, as well as impedance matching. Proper bias is provided by R01, R02 and R16. Inductors LR05, LR15 and LR19 impedance match the input.

The resultant 4.55 MHz aural intercarrier output from U12 is taken single ended at pin 9. This output feeds to the diode switch circuit. The rear-panel AURAL INTERCARRIER IN feeds through CR49 to common base amplifier Q46. Diode CR49 provides temperature compensation for Q46. The output of Q46 feeds to the diode switch circuit.

Diodes CR25, CR26, CR36, and CR45 form a switch to select either the external or internal aural intercarrier. With S04 in the external position, +15 V is applied to the cathode of CR45 and the anode of CR25. This action

causes CR25 to conduct, shorting the internal signal to ground and back biases CR26, preventing the internally generated sound carrier from passing to the 2nd Audio Mixer board (A41). Diode CR45 is back biased and CR36 passes the external aural intercarrier signal. In the internal position, CR45 and CR26 are forward biased and CR36 and CR25 back biased. The internal signal passes to the Second Audio Mixer board (A41).

Second Audio Mixer Board (A41)

This board converts the 4.5 MHz signal to about 1.01 MHz. An Aural Intercarrier Output amplifier is also included on the board.

Transformer T17 serves as a 4.5 MHz bandpass filter and single to double ended converter transformer. Input bias for amplifier U11 is provided by R12, R14, and R22 connected to −15 V. This amplifier is a dual differential pair and provides enough gain to drive demodulator U51. The output from U11 also drives T31 which serves as a 4.5 MHz bandpass filter and double ended to single ended converter. The output of T31 drives Q36, a grounded base amplifier which in turn drives emitter follower Q44. The emitter of Q44 drives the rear panel AURAL INTERCARRIER OUT jack.

Transistor Q70 serves as the 5.510 MHz local oscillator for conversion of the sound carrier to 1.010 MHz. The 5.5 MHz oscillator is a Pierce or crystal type Colpitts. The IF signal and local oscillator output are mixed in U51 and the output is fed to the Audio Limiter Board (A42).

Audio Limiter Board (A42)

This board filters the second audio mixer output, and limits the signal to a fixed amplitude.

The signal from the Second Audio Mixer drives a 1 MHz bandpass filter. The filter is composed of L95, L75, L55, L45 and associated components, and has a Butterworth response characteristic. The output from this filter feeds to U15, an amplitude limiter, which provides up to 60 dB of limiting. The differential output of U15 is converted to single ended output by T18.

AUDIO OUTPUT ⟨7⟩

Audio Discriminator Board (A43)

The circuits on this board include a limiting amplifier, a pulse count discriminator (FM detector), a calibrated amplifier, and an automatic frequency control (AFC) circuit for the Aural Only mode of operation.

1.01 MHz Aural IF from the Audio Limiter board (A42) is a 50% duty cycle square wave, with the frequency shifting according to the modulation. This signal drives another limiting amplifier that is composed of Q19 and Q18. Emitter follower Q19 switches a common base stage, Q18. Zener-diode VR12 and resistor R03 form a +5 V supply for these transistors and the following circuit.

The pulse count discriminator converts the 1.01 MHz Aural IF signal to audio. The discriminator consists of a pulse forming circuit, Q08 and Q13; a common base switch, Q14; and a low-pass filter. Figure 3-9 shows waveforms found in the discriminator circuits.

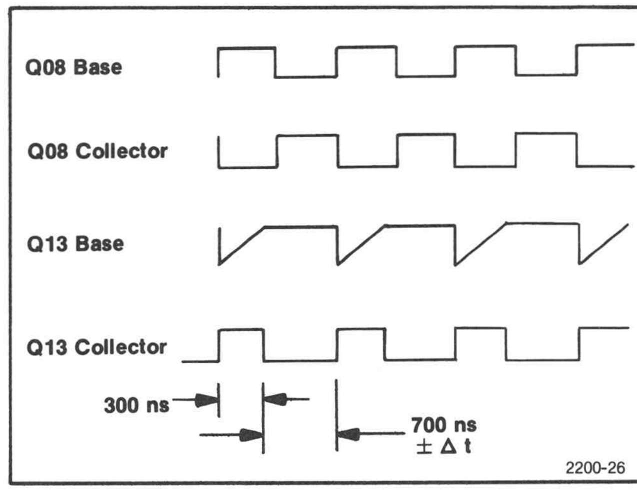


Fig. 3-9. Waveforms Associated with the Pulse Count Discriminator.

The pulse forming circuit converts the 50% duty cycle signal to a signal with the duty cycle proportional to frequency. Transistor Q08 is switched on and off at the Aural IF rate. When the collector of Q08 switches from about +6 V to 0 V, Q13 is driven off by timing capacitor C05. Capacitor C05 charges through R02 at a time constant such that after 300 nanoseconds, the base of Q13 reaches the level required to saturate. This forms a 300 nanosecond pulse at the collector of Q13.

Each 300 nanosecond pulse diverts current through R11 from Q13 to Q14 and thus to R36. The average current through R36 over a period of time is proportional to the number of pulses during that time. Because the number of pulses changes with the frequency deviation, the average voltage developed across R36 changes in proportion to the frequency deviation.

The output of the pulse count discriminator feeds a 20 kHz low pass filter composed of L41, L61 and associated components. This filter removes the 1.01 MHz carrier components, leaving only the audio. The output of

this filter is terminated by R72, which is the input resistor of the 40 dB gain amplifier composed of transistors Q80, Q82 and Q85. Potentiometer R76 and R73 provide negative feedback and set the amplifier gain so that the signal at the rear panel DEVIATION OUT connector is calibrated for 50 mV/kHz.

The collector of Q14 also feeds U58. This operational amplifier has a bandwidth of about one or two Hertz. The output of U58 shifts the frequency of the converter local oscillator so that, in the aural mode only, the sound carrier remains in the IF passband.

Audio Interface Board (A44) (B010188 and up)

This board provides intercircuit connections for all of the plug in audio circuit boards, and also contains the de-emphasis network and two audio output amplifiers.

Output from the high gain amplifier on the Audio Discriminator board (A43) feeds the rear panel DEVIATION OUT connector and the de-emphasis circuit. Resistor R48 and C39 have a time-constant of 75 microseconds, and may be switched in and out from the front panel. This de-emphasis network is a low-pass filter that has a 3-dB down point at 2.12 kHz, and attenuates the audio at 6 dB per octave. This de-emphasis curve compensates for the pre-emphasis curve at the transmitter. Pre-emphasis improves the signal to noise ratio at the higher audio frequencies.

Transistors Q28 and Q29 are connected as a unity gain buffer amplifier to provide isolation between the de-emphasis network and the output amplifiers.

The 8 ohm output stage is a non-inverting feedback amplifier, capable of delivering up to 5 watts continuously into an 8 ohm load. The amplifier is protected against accidental short circuits at the SPEAKER output by fuse F06. A spare fuse is included on the board.

The audio signal input is through the AUDIO LEVEL control, R3 on the front panel. The signal then drives Q16A, part of a differential amplifier with Q16B. Field effect diode CR18 acts as a constant 1.2 mA current source for Q16A and B. The collector of Q16A drives a complimentary symmetrical paraphase amplifier, Q17 and Q24. Voltage divider R26, R24, and CR14 supplies the base voltage for Q24 (and Q14 in the 600 ohm amplifier). Diode CR14 provides temperature compensation for base emitter voltage changes in Q17 and Q24. The output transistors, Q55 and Q57, are complimentary Darlington types. These transistors provide sufficient current gain for the required output power, with very low distortion of the signal. Transistor Q56 acts as a base emitter voltage multiplier. This transistor is mounted on a common heat sink with the Darlington transistors. This provides excellent temperature compensation, and prevents thermal runaway in the output transistors. The AUDIO OUTPUT headphone jack is wired to accept either stereo or mono type headphones.

The 600 ohm output amplifier is similar to the 8 ohm amplifier, except that it is connected as an inverting amplifier, and the output is transformer coupled. The Gain adjustment, R05, acts as the feedback resistor and, along with R06, the input resistance. Output transformer T21 contains a feedback winding that is coupled through C03. This arrangement compensates for effects on low frequency response and distortion caused by the transformer.

Audio Interface Board (A44) (B000100 through B010187)

Output from the high gain amplifier on the Audio Discriminator board (A43) feeds the rear panel DEVIATION OUT connector and the de-emphasis circuit. Resistor R15 and C29 have a time-constant of 75 microseconds. This de-emphasis network has a 3-dB down point at 2.12 kHz and attenuates the audio at 6 dB per octave. This de-emphasis curve compensates for the pre-emphasis curve at the transmitter. Pre-emphasis improves the signal-to-noise ratio at the higher audio frequencies.

Transistors Q16 and Q17 are connected as a unity gain buffer amplifier to provide isolation between the de-emphasis network and the output amplifiers.

The audio is fed through the AUDIO LEVEL control, R3, to the differential amplifier Q26 for the 8 OHM SPEAKER and AUDIO OUTPUT headphone jack outputs, and through the Gain control, R14, to Q23 for the 600 OHM BALANCED LINE output. Both circuits are similar except for the output stages. Field effect diodes in the emitter circuits of Q23 and Q26 provide constant 1.2 mA current references. The collector of one section of these transistors drives paraphase amplifiers Q38, Q36 and Q33, Q35. Bias for one side of the pairs is provided by R24 and R26. Diode CR34 provides temperature compensation. The collectors of these pairs drive the Darlington output pairs, Q55, Q57 and Q52, Q54.

Current is taken from the Darlington emitter circuits, in both cases, to drive the output loads. Transistors Q56 and Q53 provide thermal compensation for the output transistors. The four output transistors are mounted on a heat sink. As the temperature of the output transistors increases, they conduct more current and, unless prevented, current runaway would occur. Transistors Q56 and Q53 are mounted on the heat sink with the output

transistors. As the temperature increases, Q56 and Q53 also increase conduction, thus reducing excess current in the output stages.

Feedback for the low impedance amplifier occurs through the base of Q26B, and for the 600 ohm amplifier, through the gain control. The low impedance output amplifier is protected by fuse F06. The two primary windings of T21 improve low frequency response characteristics through C20 in the 600 ohm output amplifier.

IF REFERENCE OSCILLATOR and PHASE SHIFTER ⟨8⟩

Reference Control Board (A50)

The 24 MHz reference oscillator and control circuitry provides the locally generated signal for use in the IF, synchronous detector, and aural converter.

The 24.25 MHz crystal oscillator is composed of transistor Q02 with associated components. As the crystal operates in an overtone mode, L13 and C03 assure operation at the correct overtone. The output from the collector of Q02 drives mixer U23 at pin 8.

The output of the reference oscillator drives mixer U23 at pin 2 through emitter follower Q35. Resistor R36 terminates the reference oscillator input.

The voltage controlled oscillator is designed to operate at nominally 24 MHz, 250 kHz below the crystal oscillator. The circuitry will accomodate a frequency difference from −50 kHz to −500 kHz.

The mixer output is at pin 6 of U23. When the circuitry operates at design center the frequency at pin 6 of U23 is about 250 kHz, the difference frequency between the voltage controlled and crystal oscillators.

The signal passes from pin 6 of U23, through a low pass filter composed of L52, L62 and associated components, to the base of Q70. This transistor pair, Q70 and Q80, form a Schmitt multivibrator. The signal at the collector of Q80 is essentially a square wave with an amplitude of approximately 6 V peak to peak. Transistor Q80 either saturates or the collector is clamped by CR91 in the most positive direction. During each cycle, C85 charges through CR85, and discharges through Q87. The current (charges-per-second) from the collector of Q87 is proportional to the difference frequency. The current through Q87 always matches the current through Q88 when the voltage controlled oscillator frequency is stable.

The current through Q88 is determined by the temperature of the wide band SAW filter as sensed by CR18 on the A25 Filter board, and by the setting of R40 and R50 (Wide Band and Sound Trap adjustments). The voltage from CR18 varies at −2.2 millivolts/degree C. A temperature increase causes pin 5 of U56 to move in the negative direction, which increases current through Q88 to lower the frequency of the voltage controlled oscillator. This action matches the change in SAW filter center frequency, which decreases with temperature at the rate of 90 parts per million per degree C.

When the voltage controlled oscillator frequency decreases, the frequency of the signal at pin 6 of U23 increases, causing an increase in average current through Q87.

Transistor Q92 and associated components form a +6 V power supply to provide voltage for CR91 and several other points in this circuitry.

Reference Oscillator Board (A51)

The circuitry on this board generates the 24 MHz reference signal. This signal is used in the phase lock circuits, and also functions as the local oscillator (LO) signal for the video and quadrature detectors in the synchronous detection mode, and as the LO for the first audio mixer in the SPLIT audio mode.

Transistor Q22 operates as a Clapp oscillator. The tank circuit consists of L03, C07, C08, CR09, C13 and C16. Inductor L03 is adjusted to center the oscillator frequency. The control voltage from the Reference Control board (A50) sets the capacitance of varactor CR09 to produce the oscillator frequency control required for lockup.

Transistor Q16 is in series with the emitter of Q22 at dc and low frequencies, and operates as one half of a differential pair, with Q22, at higher frequencies. This assures that Q22 switches at the signal zero crossings, and effectively eliminates the second harmonic from the oscillator waveform. Power supply noise is removed by Q35. The oscillator signal from Q22 feeds Q32. These transistors form a cascode amplifier.

Transistor Q16 is in series with the emitter of Q22 at dc and low frequencies, and operates as one half of a differential pair, with Q22 at higher frequencies. This assures that Q22 switches at the signal zero crossings, and effectively eliminates the second harmonic from the oscillator waveform. Power supply noise is removed by Q35. The oscillator signal from Q22 feeds Q32. These transistors form a cascode amplifier.

@

The filter connected to the collector of Q32 is tuned to 24 MHz to attenuate any remaining harmonics. The filter output drives the base of Q72 which, in conjunction with Q74, forms a unity gain isolation-distribution amplifier. The addition of Q74 lowers the output impedance, raises the input impedance, and lowers harmonic distortion. This amplifier provides the Reference Oscillator signal to the Reference Control board (A50), the Converter Phase Lock board (A53), and through the Phase Lock Switch board (A58) to the 1st Audio Mixer board (A40). Diodes CR47 and CR48, in conjunction with the Phase Lock Switch board (A58), provide switching, with a constant load impedance, of the Reference Oscillator signal for the SPLIT mode of aural conversion.

Phase Shifter Board (A52)

In the synchronous detection mode, the circuits on this board sample the output signal from the quadrature video detector, and shift the phase of the signal to the product detectors. This provides a stable phase adjustable reference frequency with adjustable reaction times for driving the product detectors.

A dc signal proportional to the difference between the picture carrier phase and the local regenerated carrier phase is applied to the drain of FET Q03. The source of Q03 connects through R13 to pin 2 of U22. Current may flow, depending on signal amplitude, through Q03 continuously in the front panel selected CONT mode, during the sync tip time (SYNC TIP mode), or during the back porch time (BACK PORCH mode). During the selected time, the emitter of Q17 goes positive. This action causes the collector of Q17 to go positive, which causes Q03 to conduct the phase error signal from the quadrature detector to U22. Neutralization for spurious switching components is accomplished by Q15, C01 and associated components.

When the envelope detection mode is selected, the base of Q18 goes negative (−0.7 V). This action saturates Q18, causing the emitter of Q17 to go more negative, which causes the collector of Q17 to go toward −15 V. This action turns Q03 off and prevents the quadrature phase error signal from passing to U22, a FET input operational amplifier.

Operational amplifier U22 operates as an integrator. The feedback capacitance is provided by C22 and capacitors selected through the SYNCHRONOUS TIME CONSTANT switch. The capacitor values depend on the reaction time selected. The value of the shunt capacitance is different for the continuous mode and the sync tip or back porch mode. This is necessary to maintain approximately the same loop bandwidth, as the error signal is passed to U22 only during sync or back porch time.

When switching to the envelope mode from the synchronous mode, the integrating capacitors maintain the output of U22 constant for some period even though Q18 has disabled the error signal. This prevents loss of phase adjusment and consequent video output disruption when rapidly switching from synchronous to envelope detection. Diodes CR32 and CR33 are protective diodes.

The voltage at pin 6 of U22 stabilizes at some value proportional to the quadrature error signal. This voltage drives the sine and cosine shaping diode arrays connected to mixers U81 and U84. The diode arrays cause the outputs at pins 6 and 9 of U81 and U84 to vary such that the reference oscillator signal is shifted in phase in proportion to the voltage at pin 6 of U22. See Fig. 3-10.

The reference oscillator signal drives U81 through a 20 dB attenuator composed of R82 and R92, and drives U84 through a 90 degree phase shift network (L98, C90, and C95) and a 20 dB attenuator (R64 and R84).

The mixers operate in the linear region at these low signal levels (around 50 mV). The outputs of U81 and U84 are summed at the primary of T58. The secondary feeds Q59, which provides isolation and gain. Transistors Q38 and Q37 operate as a unity gain isolation amplifier, with high input impedance and low output impedance.

CONVERTER PHASE LOCK and DETECTOR LO SWITCH ⟨9⟩

Converter Phase Lock Board (A53)

This circuitry compares the frequency and phase of the 24 MHz IF carrier signal to the 24 MHz reference oscillator signal, and adjusts the frequency and phase of the converter oscillator so that no difference exists between the 24 MHz signals. Signals from Q42 and Q32 provide the control voltage for frequency differences between the 24 MHz reference oscillator and the limiter output, via the converter oscillator, from about 500 kHz to about 100 Hz. When the frequency difference is less than about 100 Hz, the output from U13 provides the control voltage for the converter oscillator. Integrated circuit U03 provides the control voltage to the Converter Oscillator in the Aural Only mode.

The limiter signal from the Detector Local Oscillator Switch board (A54) is applied to pins 7 of U81 and U87. The 24 MHz reference oscillator signal is applied to the base of emitter follower Q95 and then to pin 2 of U81. Also, the 24 MHz reference oscillator signal is shifted 90 degrees in phase by L89, C79 and C99. From there it is applied through emitter follower Q94 to pin 3 of U87.

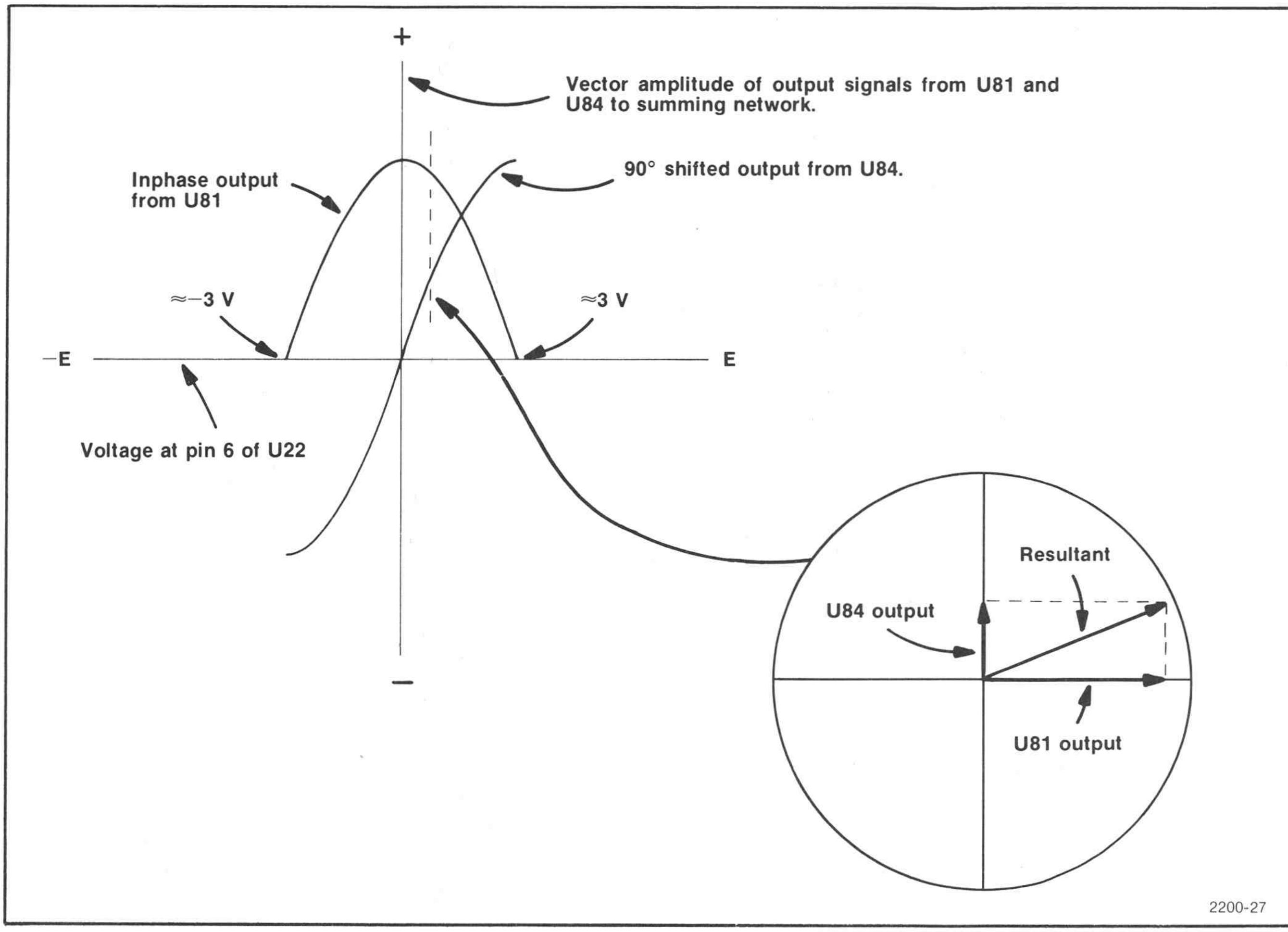


Fig. 3-10. Relationship of U22 (A52) Output Voltage and Phase of Local Synchronous Signal at Summing Network Output.

The differential output of U81, when phase locked, controls the frequency of the converter oscillator through U13. This differential signal is 0 V when phase locked, regardless of the converter oscillator frequency. The differential output of U87, when the loop is phase locked, is a dc voltage of about 1 V with pin 9 more positive than pin 6 (about +7 V and +6 V respectively).

When the loop is out of lock, the waveforms from the mixers are triangular in shape, about 1 V peak to peak (differentially about 2 V), at a frequency varying with the amount of phase and frequency difference of the 24 MHz reference oscillator and limiter outputs. The output of U87 is shifted 90 degrees from the output of U81. Outputs from both ICs pass through low pass filters. These filters remove color and sound carrier components.

The quadrature output from U87 passes to the input of U59A. No voltage appears across the input of U59A when triangle waves are present at the output of U87 because of the low pass filter, composed of R47, R48, and C57. As the circuit approaches lockup, the output of the mixers becomes closer to direct current. Very close to lockup, pin 3 of U59A becomes more positive than pin 2. Thus, pin 1 of U59A goes positive, resulting in the following: pin 7 of U59B goes positive, opening the common emitter current path for Q45 and Q46, thus disabling the frequency lock; Q08 is switched off, allowing the back porch timing pulse to pass to the control input of U13; the UNLOCKED light is switched off; and the video detector is allowed to switch to synchronous detection, if selected.

When locked, the converter local oscillator is controlled through U13 by a dc signal at its input. A positive going voltage at pin 6 of U13 decreases the converter frequency, and a negative going output increases the frequency. When the circuit is not in lock, triangle waveforms pass through U13. These waveforms are averaged by C33 and have no effect on the frequency of the converter oscillator.

If the Converter Control board (A56) is removed, R23 provides a ground path for C33.

Integrated circuit U13 is a variable transconductance amplifier that samples continuously during unlocked time, and is gated during lock time. Continuous sampling while unlocked prevents the phase lock from side locking to a multiple of the sampling frequency. Amplifier U13 is gated during lock to prevent any composite video present at its input (due to incidental carrier phase modulation in the transmitter) from varying the converter oscillator frequency. When the circuitry is out of lock, the current flowing through pin 5 of U13 is about 5 μA from R18 through CR19, providing relatively low continuous gain for U13. As the circuitry approaches lock up, Q08 turns off. This allows the positive going back porch timing pulse to gate the current to pin 5 of U13 between 150 μA when the pulse is positive (increasing the gain by a factor of about 30), and 0 μA (0 gain) during the low portion of the cycle. The average current to pin 5 of U13 is still 5 μA.

Integrated circuit U13 is a variable transconductance amplifier that samples continuously during unlocked time, and is gated during lock time. Continuous sampling while unlocked prevents the phase lock from side locking to a multiple of the sampling frequency. Amplifier U13 is gated during lock to prevent any composite video present at its input (due to incidental carrier phase modulation in the transmitter) from varying the converter oscillator frequency. When the circuitry is out of lock, the current flowing through pin 5 of U13 is about 5 microamps from R18 through CR19, providing relatively low continuous gain for U13. As the circuitry approaches lock up, Q08 turns off. This allows the positive going back porch timing pulse to gate the current to pin 5 of U13 between 150 μA when the pulse is positive (increasing the gain by a factor of about 30), and 0 μA (0 gain) during the low portion of the cycle. The average current to pin 5 of U13 is still 5 μA.

The major frequency locking function is accomplished by combining the signals from Q53 with Q45, and from Q43 with Q46. The triangle waveforms driving the bases of these transistors cause them to switch at the midpoints of the triangles, forming square waves. Pins 9 and 6 are 180 degrees out of phase with each other for both U81 and U87, and the outputs from U87 are shifted 90 degrees from those of U81. The output from Q50 is inverted by Q43 so that the gating signals at the emitters of Q42 and Q32 are in phase.

The waveforms at the collectors of Q45 and Q46 are differentiated by C44 and C45, and combined with the gating signals from the collectors of Q43 and Q53. The phase of the gating signals from Q43 and Q53 changes 180 degrees ($\pm$90 to $\mp$90) from the phase of the differentiated spikes, depending on whether the 24 MHz limiter output-frequency (IF picture carrier) is above or below the reference oscillator. The leading edge of the differentiated pulse is always delayed 90 degrees from the leading edge of the gating waveform.

If, for example, the limited picture IF is above the reference frequency, the following events re-occur. Because Q53 is off, a positive differentiated pulse from C44 appears at the emitter, and thus the collector of Q42, delivering a positive charge to C33. The negative going spike from C45 occurs when Q43 is on. This decreases current flow through CR23, and does not appear at the collector of Q32. The next differentiated negative going spike occurs when Q53 is conducting current through CR42. The spike does not appear at the collector of Q42, but simply increases current flow through CR42. The positive going spike from C45, when Q43 is off, is conducted through CR23 and does not appear at the collector of Q32. The net result is that the voltage across C33 increases, lowering the converter LO frequency, and thus lowering the picture IF frequency.

As the limiter output shifts in frequency towards the reference frequency, the frequency of the positive or negative going spikes decreases. The negative going spikes pass through Q32 if the limitier frequency is below the reference frequency, and the positive going spikes pass through Q42 if the limitier frequency is above. This action continues until the dc voltage on C33 is such that the two signals are the same frequency. At this time, Q45 and Q46 are disabled and U13 completes the final phase-adjustment as described previously.

The circuit at the collectors of Q45 and Q46 forms an adaptive low pass filter. Its purpose is to eliminate "noise" pulses when the signal is low frequency and approaching lock. When Q45 and Q46 have a low frequency output, CR24 and CR26 connect C15 and C34 across the collectors, shorting the signal. When the output is a high frequency signal, the time constant of C15-R14 and C34-R15 maintains the charge on the capacitors, reverse biasing the diodes, and allowing the signal to pass.

When the AURAL ONLY and SPLIT switches on A44 are engaged, the Audio AFC (Automatic Frequency Control) signal, also from A44, is used to set the Converter Oscillator frequency. This places the aural signal in the frequency lock feedback loop, ensuring that the Converter Oscillator converts the aural IF carrier to the center frequency of the audio discriminator. (This mode is usually used when only the aural carrier is present.) In this mode, about +15 V is applied to pin 3 of this board. That voltage causes Q18 to saturate, shutting off U13; pulls the input of U59B high, causing CR47 to reverse bias and shut off Q45 and Q46; and provides current to pin 5 of variable transconductance amplifier U03, allowing the audio afc signal I to be amplified and drive the converter control output.

Detector, Local Oscillator Switch Board (A54)

This board includes circuits to distribute the limiter signal and to switch between the limiter signal (for envelope detection) and the reference oscillator (for synchronous detection) as the local oscillator source to the video detector.

A unity gain isolation amplifier consisting of Q62 and Q72 provides a low immpedance output for the limiter signal. This amplifier drives the Converter Phase Lock board (A53), the Audio Source switch circuit on the Phase Lock Switch board (A58), and the video LO switch circuit on this board.

When the intercarrier mode of sound detection is chosen, a negative voltage (−15 V) appears on the cathode of CR78. This permits the limiter output to pass to the 28 MHz sound mixer through CR78. The limiter signal terminates to ground through CR59 in the split mode of sound detection, maintaining a constant load on the isolation amplifier.

The bases of Q03 and Q19 are low when envelope detection is selected, or when the phase lock loop is unlocked. This lowers the junction of R50 and R12, which turns CR41, CR61 and CR15 on. This action allows the limiter signal to pass to Q34, and terminates the reference oscillator signal through R25, C13, and CR15.

When the bases of Q03 and Q19 are high, the junction of R50 and R05 goes high turning CR14, CR22, and CR63 on and CR15, CR61 and CR41 off. The reference oscillator is now fed to the base of Q34 and the limiter output is terminated.

The reference oscillator signal is an approximate sinewave, and the limiter output signal is a square wave. Transistors Q34 and Q35 operate as an emitter coupled wave shaper. The output at the collector of Q35 is an approximate square wave signal.

CONVERTER LO and LIMITER ⟨10⟩

Converter Control Board (A56)

The Converter Local Oscillator circuits are similar to those found in the Reference Oscillator and Control boards described earlier and shown on diagram 8. The major difference is the frequency of operation.

The Converter-Control Oscillator circuit is a Pierce crystal oscillator, consisting of Q02 and associated components. The crystal frequency is 24.25 MHz above the visual IF. Series resonant circuit L13 and C13 connects the feedback capacitors C15 and C05 only at the operating frequency. This ensures that Y18 operates on the correct overtone.

Mixer U22 combines the output of the converter crystal oscillator and the converter vco output from A57. The vco feeds through Q35 to pin 2 of U22.

When the circuitry operates at design center, the frequency at pin 6 of U22 is 250 kHz. The signal passes through L50 and L60 which, with associated components, form a low pass filter.

Transistors Q91 and Q92 form a Schmitt multivibrator. Feedback is accomplished through R83. The signal at the collector of Q92 is a square wave with a voltage of approximately 6 V p-p. Transistor Q95 supplies 6 V for the collectors of Q91 and Q92. During each cycle, C73 charges through CR62 and discharges through Q74. The current (charge/cycle X cycles/second) from the collector of Q74 is proportional to the difference frequency.

During stable operation, current following through Q74 will equal current flowing through Q64. Current through Q64 is controlled by Q55A, which in turn is controlled by the dc voltage at the output of the Converter Phase Lock board (A53). FET Q55B provides constant current for Q55A. Transistor Q64 acts as a voltage to current converter.

If the converter oscillator goes low in frequency, the output at pin 6 of U22 increases in frequency. This causes more current to flow through Q74, decreasing the voltage to the frequency control circuit of the converter oscillator, which in turn increases the frequency of the converter oscillator. This action continues until the frequency difference is such that the current through Q74 matches the current through Q64. Should the phase lock loop indicate that a change in vco frequency is required, the current through Q64 changes and the frequency adjusts until the currents are equal.

Converter Oscillator Board (A57)

The voltage controlled oscillator center frequency is about 250 kHz below the crystal oscillator.

Transistor Q22 operates as a series tuned Colpitts oscillator. Tank circuit inductance is provided by L03. Positive feedback occurs via C14 and C15. Frequency control is provided by CR09. A negative going control signal at pin 3 of A57 causes the frequency to increase. Power supply variations are filtered out by Q35. The output signal from the collector of Q22 feeds to Q32,

forming a cascode stage. This stage isolates the filter, composed of L41 and C30, from the oscillator. Power gain is provided by Q62, which drives an impedance transforming bandpass filter. This filter is necessary to minimize IF feed through in the IF mixer.

Limiter Board (A55)

This circuitry picks off the IF signal at the output of the IF Post Amp, and eliminates any amplitude modulation. The output is essentially square waves at the 24 MHz visual IF rate. Any frequency or phase modulation of the RF visual carrier will appear on this signal.

The limiter is essentially four stages of emitter coupled amplification and limiting. The four pairs of amplifiers are Q15 and Q22, Q35 and Q43, Q55 and Q63, and Q75 and Q92. Current for these transistor pairs are provided by four sets of transistors; Q02 and Q21, Q32 and Q41, Q52 and Q60, and Q81 and Q90.

The first amplifier pair is driven by Q09, operated in grounded base configuration for isolation purposes. The inductors in the emitter circuits, L15 and others, provide necessary peaking. Power supply isolation is provided by L17 and C14, and other associated components connected in a similar manner.

Both constant current transistors in each stage supply equal current to each half of the amplifying transistor pairs. Limiting action takes place as the signal current exceeds the emitter bias current. The amplifier pairs are capacitively coupled to ensure precise switching at zero crossing. The delay through this circuit is adjusted by the potentiometers connected to the bases of the constant current transistors. This delay is set so that the quadrature output is zero when the unit is operating in the envelope detection mode. Overall circuit gain is about 80 dB.

AGC SAMPLE AND HOLD and ZERO CARRIER TIMING ⟨11⟩

Sync Stripper

The composite video is coupled through a 1.5 MHz low pass filter (luminance signal only) to the base of Q17. This emitter follower drives U24, which provides continuous negative going horizontal sync pulses at pin 7 and a negative going pulse at pin 4 during the first 3 microseconds of the back porch time. A back porch pulse from U24 cannot occur more often than 63 microseconds. Inverter U33F provides a positive going pulse, with the leading edge coincident with the beginning of the back porch, to the phase shifter and other circuitry. The pulse is also inverted by U33C and passed to U41 at pins 3 and 4.

The regenerated horizontal sync pulses also feed a pulse generator composed of Q20, R20, and C20. This timing circuit provides a 1 microsecond pulse during and for each horizontal sync tip time. This action allows sampling of equalizing pulses during the vertical interval. From the collector of Q20, these pulses feed U33A and U33B. These inverters, and also U33F, protect their associated circuitry from overvoltage if the Phase Lock boards are misconnected when used with a circuit board extender.

Sample and Hold

A dc voltage level at either back porch or horizontal sync tip time is provided for the automatic gain control circuitry. The time of sampling is selected by front panel pushbuttons. A positive going pulse from the back porch output, or the sync tip sampling pulse, appears at pin 11 of U31D. This is the sample time for the sample and hold circuitry composed of U18, Q14, and Q12. Composite video (luminance) is present at pin 3 of U18. When the SYNC TIP button is activated, Q09 conducts. This raises the dc level of the composite video to U18 equal to the difference between back porch and sync tip. The average output level from Q12 does not shift with respect to the sampling time selected.

The positive pulse at pin 11 of U31D is ac coupled to pin 5 of U18. Integrated circuit U18 is a variable transconductance amplifier used as a sample and hold device. When pin 5 goes high, U18 turns on and the dc level corresponding to the sync tip or back porch appears across C14, the hold capacitor. When the pulse at pin 5 disappears, U18 turns off until the next pulse. When no pulse is present at pin 5 of U18 for several seconds (CW signal with no modulation applied to the demodulator input), pin 5 is so biased that U18 begins conduction, providing a dc output level relative to the average input level. FET Q14 drives Q12, which provides a dc level proportional to the signal strength to the agc circuitry. When the emitter of Q12 goes more negative, the IF attenuation increases. In early instruments Q13 increases conduction with IF overdrive, thus increasing IF attenuation.

Operational amplifier U45A provides drive for the high and low indicator lights on the front panel. The range that both lights are off is determined by R44.

Clock

The clock pulses for the A-D Converter and readout circuitry are generated by U64A. This circuit operates as a free running oscillator. The outputs from pin 8 of U53B and pin 5 of U53A are square waves shifted by 90 degrees at one half the oscillator frequency.

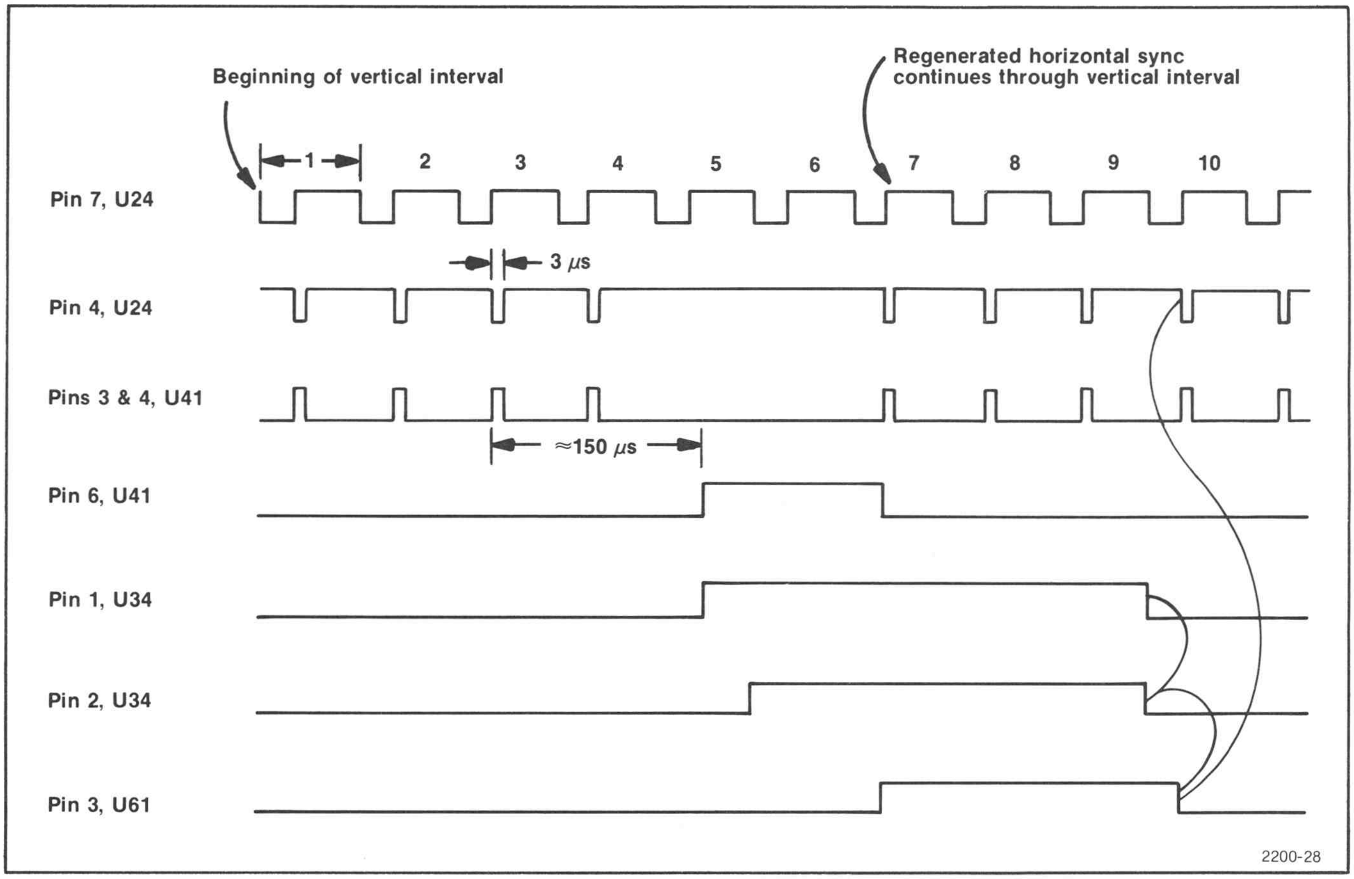


Fig. 3-11. Zero Carrier Timing Diagram.

Zero Carrier Timing

Integrated circuit U41, a retriggerable one shot multivibrator, outputs a low at pin 6 on the first back porch of a field, and stays low until approximately 150 microseconds after the last back porch pulse from U24 during the vertical blanking interval. Pin 6 remains high until the falling edge of the first back porch pulse appears. Pin 6 then goes low and remains low until the next vertical interval. Shortly after pin 6 of U41 goes high, pin 6 of U43A and pin 1 of U34 also go high.

When pin 1 of U34 went low after the previous vertical interval, the binary number three was loaded into the counter (pins 4 and 10 high and pins 3 and 11 low) and appeared at the output with pin 5 high, the B output (unused) high, and pin 2 low. See Fig. 3-11. The next regenerated horizontal sync pulse from pin 7 of U24 clocks pin 2 of U34 high. This action sets the input to shift-register U61 high. On the next back porch pulse to pin 8 of U61, pin 3 of U61 goes high. When pin 2 of U34 goes high, U34 commences counting. See Fig. 3-12 for the truth table for U34. Each count, processed as a regenerated horizontal sync pulse, appears at pin 8 of U34. On the fifth sync pulse, pin 2 of U34 goes low. This action causes the preset, pin 4, of U43A, to go low which lowers $\overline{Q}$, pin 6, of U43A.

	Pin 5	Unused	Pin 2	Unused	
	A	B	C	D	
Load	1	1	0	0	Pin 1 (load) low
1st horiz sync after load goes high	0	0	1	0	Pin 1 (load) high
2nd horiz sync	1	0	1	0	Pin 1 (load) high
3rd horiz sync	0	1	1	0	Pin 1 (load) high
4th horiz sync	1	1	1	0	Pin 1 (load) high
5th horiz sync	0	0	0	1	Pin 1 (load) high
Load	1	1	0	0	Pin 1 (load) low

2200-29

Fig. 3-12. Truth Table for U34 at A60.

@

This action loads U34 with a binary three as shown in the truth table, and the cycle repeats at the next vertical interval. When the data input to U61 goes low, the pulse width from the shift register is determined. At the next horizontal sync pulse, after pin 3 of U61 went high, pin 4 of U61 goes high and remains high for the same time as pin 3. This action continues for 25 lines, with U65 following the count from U61. The instrument is shipped with jumper P73 selected for the internal zero carrier pulse at horizontal line 20.

The purpose of U62B is to set the commencement of the zero carrier timing pulse into active video time. The purpose of U62A is to determine the pulse width.

The negative going output from U61 or U65 causes the $\overline{Q}$, pin 12, of U62B to go low and stay low for about 14 microseconds. When pin 12 of U62B again goes high, it triggers a negative-going 30 microsecond duration pulse at pin 4 of U26A. This pulse gates through U64C as the zero carrier timing pulse. An external zero carrier timing pulse can be fed from J17 on the rear panel to the base of Q51, which inverts the pulse for the input of U64C.

If the internal and external zero carrier pulses are on different lines, both will appear at the output of U64C. If the pulses are on the same line, the output pulse width will depend on the start and stop times of the two inputs.

The internal zero carrier reference pulse can be turned off from the front panel. This is done by grounding the clear pin of U62A.

Attenuator Control

The attenuator switches provide control for the front end RF Attenuator, A1, and offset the readout to compensate for the added attenuation.

The attenuator clock signal from the Readout Driver board, A61, drives Q11. This supplies pulses of current through the ATTENUATOR switches to the latching solenoids of the Attenuator, A1. When a switch is in the current pulses latch the attenuator in. When the switch is out the attenuator leads are reversed, and the attenuator is latched out. The resistor from the +15 V supply to the collector of Q11 provides holding current to keep the solenoid latched without drawing excessive power.

Each ATTENUATOR switch also has a section that, when activated, grounds inputs to the Readout Driver circuitry on A61. This offsets the readout by the amount of attenuation.

AGC A/D CONVERTER and PIN DRIVE DECODER ⟨12⟩

The agc circuit takes the sample and hold level from diagram 11 and converts it to a digital signal to control the PIN diode attenuators, and to provide readout of the input power.

Gain Control

In the AUTO mode, integrating operational amplifier U12 averages the transitions between samples. This appears as a ramp of opposite polarity at the integrator output. The speed of this averaging is determined by the setting of the AGC SPEED control, R1, on the front panel. At the fastest speed, the agc loop bandwidth is about 320 Hz and averages about 11 lines. This averages out any sampling errors, and changes the gain fast enough for most signal variations (e.g., airplane flutter) to be corrected before they appear at the output. At the slowest speed setting, the agc bandwidth is about 7 Hz, and the integrator averages almost 800 lines. This changes the gain at a slow enough rate that low frequency effects (e.g., mains hum) will show up at the output. Diode CR16 clamps the output of U12 from going below −0.6 V.

In the MANUAL mode, the agc loop is opened and the gain control circuitry is driven by R2 on the front panel (a 3-turn potentiometer labeled MANUAL GAIN). Integrated circuit U17A is connected in the feedback loop around U12, turning the circuit into a follower. Resistor R2 is connected as a variable voltage divider with the low voltage end connected to a forward biased diode, CR34, for temperature tracking. Resistor R2 sets a voltage at the negative input of U17A, which in turn causes an offset in the output of U12, thus changing the gain control signal.

Integrated circuit U17A is connected across U12 and integrating-capacitor C15. This precharges C15. In the normal case of the MANUAL GAIN control set close to the correct agc level, the capacitor is already charged close to the correct level. This eliminates any annoying change in the output signal while waiting for the agc to recharge C15 to the correct level.

For instruments with serial numbers B000119 and below, the MANUAL GAIN circuit operation is essentially the same as in later instruments. However, the MANUAL switch, S06, is located in series with the output of U17A. A slight interaction occurs between the MANUAL GAIN and AGC SPEED controls when in the MANUAL mode. Other component differences around U17A cause slower operation in the earlier instruments.

Coarse A/D Converter

The circuitry in this block takes the analog gain control signal from integrator U12, and converts it to a parallel 7 bit binary signal used by the PIN Drive Decoder, the D-A Converter, and the readout circuits. This circuitry also supplies an analog fine agc current that drives a PIN diode in the IF Post Amp (A26) shown on diagram 3, and an analog signal and a reference level for the Readout A/D Converter, shown on diagram 13.

The circuits in this block consist of inverting operational amplifier U45B; fine agc circuit Q37; comparators U48A and U48B; counter control circuits U66A, U66B, U73B, and U64B; and up down counters U86 and U76.

Inverting operational amplifier U45B provides the fine agc signal, the analog signal for the Readout A/D Converter on diagram 13, and drives the counter control circuits in this block. Inputs are received from the Gain Control circuit through R32, and the D/A Converter circuit. Transistor Q36 provides a positive clamp at about +4.6 V, and diode CR37 provides a negative clamp at about 0 V, for out of range signals. Resistor R35 sets the output level to about +3 V when the other two input currents cancel each other.

Transistor Q37 provides the fine agc current to the IF Post Amplifier (A26) on diagram 3. Fine AGC Adjust, R47, calibrates the amount of gain control from this circuit.

Comparators U48A and U48B monitor the output of U45B, and when the output level goes under +2 V or over +4 V, a comparator switches. The resistor string R36, R49, and R37 form a voltage divider to set the upper clamp level of the output of U45B. The comparator output goes high when the positive input is higher than the negative input. The output of U48A goes low when the input signal is about +4 V. The output of U48B goes low when the input goes below +2 V.

Type D flip-flops U66A and U66B are driven by the comparator outputs, and receive a clock signal from diagram 11. If the output at pin 5 of U66A is high, counters U86 and U76 will count down; if low, they will count up. NAND gate U64B enables clock pulses from diagram 11 when the output of U45B is out of its 2 to 4 volt window. These clock pulses are used to clock binary counters U86 and U76.

A total of seven data outputs are used from the two counter ICs, U86 and U76. Terminal Q(a) of U86 is the least significant bit, and Q(c) of U76 is the most significant bit. The ripple carry (R/C) output of U86 goes low to enable U76 when U86 overflows or underflows. The seven parallel data lines drive the D/A Converter, the PIN Drive Decoder, and the readout circuit. When the counter output reaches the binary equivalent of 0 or 95, pin 9 of PROM U94 goes high disabling the counters. This provides a total counter range of 94 steps.

Figure 3-13 shows some waveforms that may be used to help understand the operation of the A/D circuit. (It should be noted that these waveforms do not account for the effect of the PIN diode attenuators on the input signal, and therefore will not occur in the actual circuit. They are presented here only as an aid to understanding the circuit operation.) If the input signal changes by some amount, that change will be integrated by the Gain Control circuitry, and coupled to U45B as a current through R32. As the current through R32 increases, the output voltage of U45B decreases until the level reaches +2 V. At this point, comparator U48B switches to a TTL low. The low is transferred, at the appropriate time, through U66A to set the binary counters, U76 and U86, to count up. At the same time, the Q output of U66A is transferred through U73B to enable the counter clock through U64B. The next counter clock pulse causes the counters to increase their count by one. This causes the D/A Converter to add a step of current in the opposite polarity, effectively canceling the current through R32, and driving the output of U45B back to a midpoint of about +3 V.

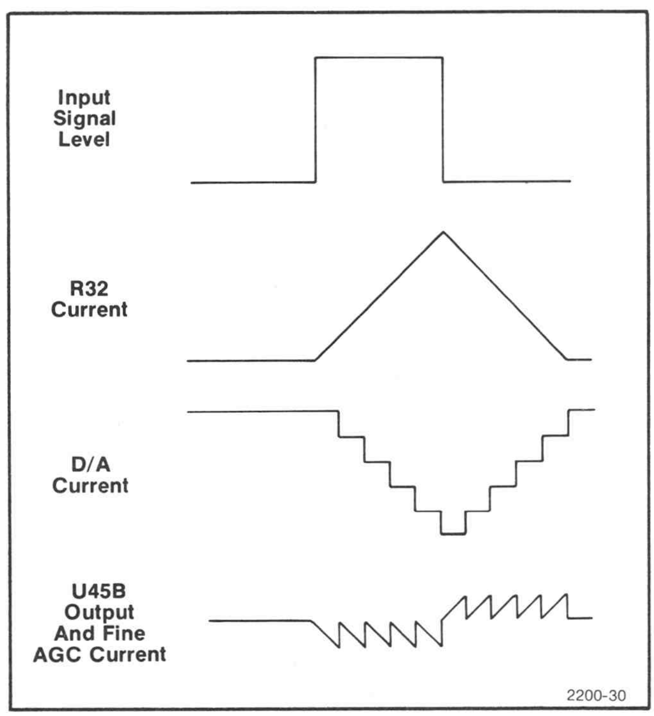


Fig. 3-13. Waveforms for Understanding the AGC A/D Converter Operation.

@

When the input signal decreases, the circuit works in the opposite manner. The output of U45B goes more positive, and at +4 V comparator U48A switches, causing the binary counters to count down. This decreases the current from the D/A Converter, and again returns the output of U45B to +3 V.

D/A Converter

The D/A Converter (digital-to-analog) is driven by the binary counters in the A/D Converter block to provide steps of analog currents for offsetting the gain control current into U45B. The D/A converter consists of a set of seven inverters, driving seven diode switched, binary weighted current sources. The current sources are a set of binary weighted resistances, connected between the low impedance points of the −15 V power supply and the negative input of U45B. The resistances selected by the four most significant bits are adjustable. When an inverter output is low, the diode at that point is shut off, and current flows from the associated resistor through a series diode, and into the negative input of U45B. If an inverter output is high, the diode at the inverter is on, turning the diode to U45B off, and sinking the current from the resistors into the inverter.

PIN Drive Decoder

The PIN Drive Decoder circuitry converts the 96 count binary signal from the A/D Converter to three 32 count binary signals for driving the three PIN Driver circuits.

The circuit consists of PROM U74 and U94, and an array of logic gates. The upper set of gates, U73A, and U71A, B, C, and D provide the output for PIN Driver A31; the middle set of gates, U91A, B, C, and D, and U93A provide the output for the PIN Driver in the Down Converter. Gate U83D selects between A30 and the Down Converter PIN Drivers.

The PROMs have a 256 X 4 bit format. The seven binary data lines from the A/D Converter feed the A_0 through A_6 input address lines of both ICs in parallel. The A_7 input of U94 is controlled by the counter up/down control line, and the A_7 input of U74 is not used.

The eight output lines of the two PROMs are used to provide several functions. Terminal O_1 through O_4 of U74, and O_1 of U94 provide the five data output lines, with O_1 of U74 the least significant bit, and O_1 of U94 the most significant bit. Pins O_2 and O_3 of U94 provide selection of the output gates. Pin O_4 of U94 disables the counters in the A/D Converter and enables U79B in the Alarm circuit when the count is maximum or minimum, indicating that the input signal is out of the agc range.

Figure 3-14 lists data useful in understanding the operation of this circuit. As the input binary signal counts from 0_{10} to 93_{10} the output data lines count from 0_{10} to 31_{10} three times, to drive the gate arrays.

When the counters are at count 0_{10} through 31_{10} pin O_2 of U94 is low, enabling the output data to pass through the upper set of output gates to PIN Driver A31. At this time, pin O_3 of U94 is also low, disabling the middle set of AND gates, and thus inhibiting the data from driving PIN Driver A30 and holding these outputs low. Exclusive OR U83D senses the lows on pins O_2 and O_3 of U94, and gives a low output, holding the lower set of AND gates low.

For counts of 32_{10} through 62_{10}, both pins O_2 and O_3 of U94 go high. This holds the outputs of the upper set of gates high (data output of 31_{10}), enables the data through the middle set of gates, and holds the lower set of gates low.

For counts of 63_{10} through 93_{10}, pin O_3 of U94 is low. This continues holding the upper gates high, disables the middle AND gates and sets the exclusive ORs high, and enables the data through the lower set of gates.

Alarm

In case of a loss of visual or aural carrier, the Alarm circuit gives a visual warning on the front panel and provides switched relay contacts to drive an external alarm circuit.

When the visual carrier is lost, or below the agc range, the output of U79B goes low. This energizes the VISUAL CARRIER LOSS light, DS4, and causes pin 11 of U79D to go low, energizing the AURAL CARRIER LOSS light, DS3. With pin 11 of U79D low, CR88 turns off, and C88 is discharged through R83. After about a one-half second delay, C88 is discharged enough to switch off Q89, thus de-energizing relay K97. Diode CR98 turns on when the field of the relay coil collapses, protecting Q89 from possible damage by the reverse voltage spike that would otherwise occur. The relay contacts are available at the rear panel REMOTE CONNECTOR, J14, for controlling external alarm circuits. Refer to the Installation portion of the Operating Instructions in Section 2 of this manual for further details about the external connections.

In the case where only the aural carrier is lost, the aural alarm signal from A44 goes low, causing U79D pin 11 to go low, via U79A, activating the relay alarm circuit, and the AURAL CARRIER LOSS light.

Count	A31	A30	Down Converter	U94 Pin 11	U94 Pin 10	U94 Pin 9
	Pin Driver Addresses			Output Gate Select		Counter Enable
0	0	0	0	LO	LO	HI
1	1	0	0	LO	LO	LO
2	2	0	0	LO	LO	LO
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.
31	31	0	0	LO	LO	LO
32	31	1	0	HI	HI	LO
33	31	2	0	HI	HI	LO
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.
62	31	31	0	HI	HI	LO
63	31	31	1	HI	LO	LO
64	31	31	2	HI	LO	LO
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.
93	31	31	31	HI	LO	HI

2200-31

Fig. 3-14. PIN Driver Decoder Data.

+10 V Supply

Voltage divider R19 and R06 provides +10 volts to the positive input of voltage follower U17B. The follower supplies +10 volts to the comparator divider in the A/D Converter, and the MANUAL GAIN control, R2. The voltage is also supplied to the sync tip offset circuit shown in the Sample and Hold block on Diagram 11.

READOUT DRIVER ⟨13⟩

This circuitry converts the digital and analog agc signal to a signal capable of driving the front panel display.

Clock

A clock signal at about two Hertz is generated by U91. This signal feeds to the base of Q11 shown on the Zero Carrier Timing schematic 11. The signal at the collector of Q11 is switched to the A1 attenuator latching relays. Switch S03 changes the direction of the current through the latching relay coils, thus changing the attenuation as selected. When pin 3 of U91 goes low, U63B is preset through CR91. This action causes a low on pin 8 of U63B. This low remains until the readout clock pulse goes high. On the rising edge of the clock input, pin 11 of U63B, the output (pin 8) goes high. This action causes pin 13 of U60D to go high. Pin 8 of U60C goes low at this time, but pin 12 of U60D remains high for a short time while C72 discharges through R62. The low then creates a short, negative going pulse at pin 11 of U60D, with a falling edge coincident with the positive going edge of the readout clock. This low at pin 11 of U60D feeds to U60B which resets U81, loads the data bits present on the agc data bus into binary counters U88 and U98 and the preset inputs to decimal counters U43, U46 and U48.

Binary Counters

Pin 5 of U60B goes low about every one-half second. Pin 6 of U60B goes high at the same time. This action starts U81 counting. The clock to pin 14 triggers the counting on the negative edge. See Fig. 3-15 for the timing diagram for U81. When the binary data (maximum 95 counts) are loaded into U88 and U98, one or both of the maximum-minimum terminals will be low. Also, at least one of the maximum-minimum outputs for the decimal counters U43, U46 and U48 is low. These lows at pins 12 or 13 of U68D cause a low at pin 11 of U68D, which enables decimal counter U48 and binary counter U98. On the next clock pulse, at pins 1, 2 and 13 of U65A and at pins 14 of the decimal counters, the counters start the count. As shown in the timing diagram, U81 outputs one pulse to pins 14 of U98 and U88, for each seven readout clock pulses. This accounts for the 0.7 dB change in attenuation for each binary data unit in the agc circuit.

@

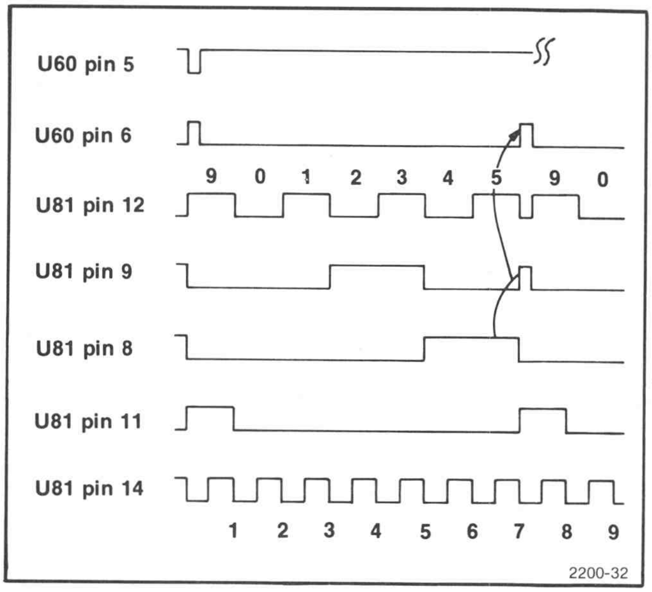


Fig. 3-15. Timing Diagram for Divide by Seven Counter, U81 on A61.

Fine A/D Converter

The reference voltage for the fine agc range between the 0.7 dB steps is applied to the base of Q96A. The voltage at the emitter of Q96A and pin 2 of U94 is about +3.6 V. The voltage at the emitter of Q96B varies between about +1.6 V and +3.6 V, depending on the amount of attenuation (0 dB to 1.4 dB) required. The voltage at the emitter of Q96B determines the number of clock pulses, charging and discharging Q93 and C94, necessary to charge C92 to a sufficient voltage so that pin 3 of U94 reaches the same level as pin 2. The capacitance of C94 is adjusted so that when the voltage at the emitter of Q96B is at the lowest value, exactly 14 clock pulses are required to raise the voltage at pin 3 of U94 to equal the voltage at pin 2. After the binary counters stop, the decimal counters continue counting until pin 7 of U94 goes low.

Pins 6 and 9 of U85 are high as previously described. This action causes a high on pin 1 of U68A, with pin 11 of U68D high. On the next negative going clock pulse, pin 2 of U68A goes low, causing pin 3 of U68A to go low. With pin 6 of U68B high, Q73 conducts and Q92 is off. At the same time, Q83 conducts, bringing the collector near ground. Charge accumulated on C94 and C93 discharges through CR96 to +5 V. When pin 2 of U68A goes low at the next negative-going clock transition, Q83 stops conduction and C93 and C94 charge toward +15 V. All current charging C93 and C94 must be absorbed by C92 through Q95. When the voltage across C92 matches the voltage on pin 2 of U94, pin 7 of U94 goes low, pins 4 and 8 of U85 go high, and pins 6 and 9 low. This action places a high on the enable terminals of the decimal counters, causing them to stop counting.

Offset

The inputs of U43, U46, and U48 are preset depending on the starting count desired. The start count is determined by the settings of S57 and S59. This count is factory set at 39.5. See Fig. 3-16. The fixed attenuation pushbuttons on the front panel add up to an additional 300 counts, depending on the attenuation selected. When both pushbuttons are pressed, pins 11 and 7 of U41 are raised to +5 V. If 10 dB of fixed attenuation is added, only pin 11 is raised. If 20 dB is added, pin 7 is raised to +5 V. This digital information is added to the preset from S57 and S59. Switches S57 and S59 may be reset to other starting counts within the range of the readout, which is a total of 67.9 dB. For example, if 20 dB of additional gain is added to the input of the 1450-1, to read the actual signal strength, set the counter start to 59.5 (39.5 + 20). The readout will now read from approximately −89.5 to −21.6 with the front-panel attenuator pushbuttons released, or −59.5 to +8.4 with the attenuator pushbuttons pressed.

Decimal Counters

As the decimal counters start at the most negative reading, progress to 0 dB and then count up for a positive dB reading, the decimal counters must switch from count-down to count-up. When the three decimal counters reach 0, pins 3, 4, and 5 of U65B all go high. This action lowers the clear pin at U63A, causing pin 5 to go low. This action lowers the cathode of the vertical bar in the plus sign of DS24 on the Readout Board (A62) and changes the decimal counters to the count up mode. The counting continues until the count in the binary counters reaches zero. At this time, pins 12 of U88 and U98 both go high, placing a high on pin 9 of U68C and pin 5 of U68B. The decimal counters continue to count as pin 10 of U68C is still low.

LED Drivers

The accumulated count in the decimal counters is processed through binary coded decimal to seven sement decoders, U32 for the tens digit, U35 for the ones digit, and U38 for the tenths digit. A high is also placed on the input of U65C, which causes Q50 to conduct. This action applies anode voltage to the polarity sign and the three digit display modules displaying the accumulated count. After the count is displayed, the cycle repeats.

POWER SUPPLY ⟨14⟩

The +15 V and +5 V supplies are referenced to the −15 V supply, which is referenced to zener diode VR62. All supplies have the series pass transistors configured as collector outputs. This allows the regulated outputs to operate closer (approximately 1 V drop) to the unregulated busses.

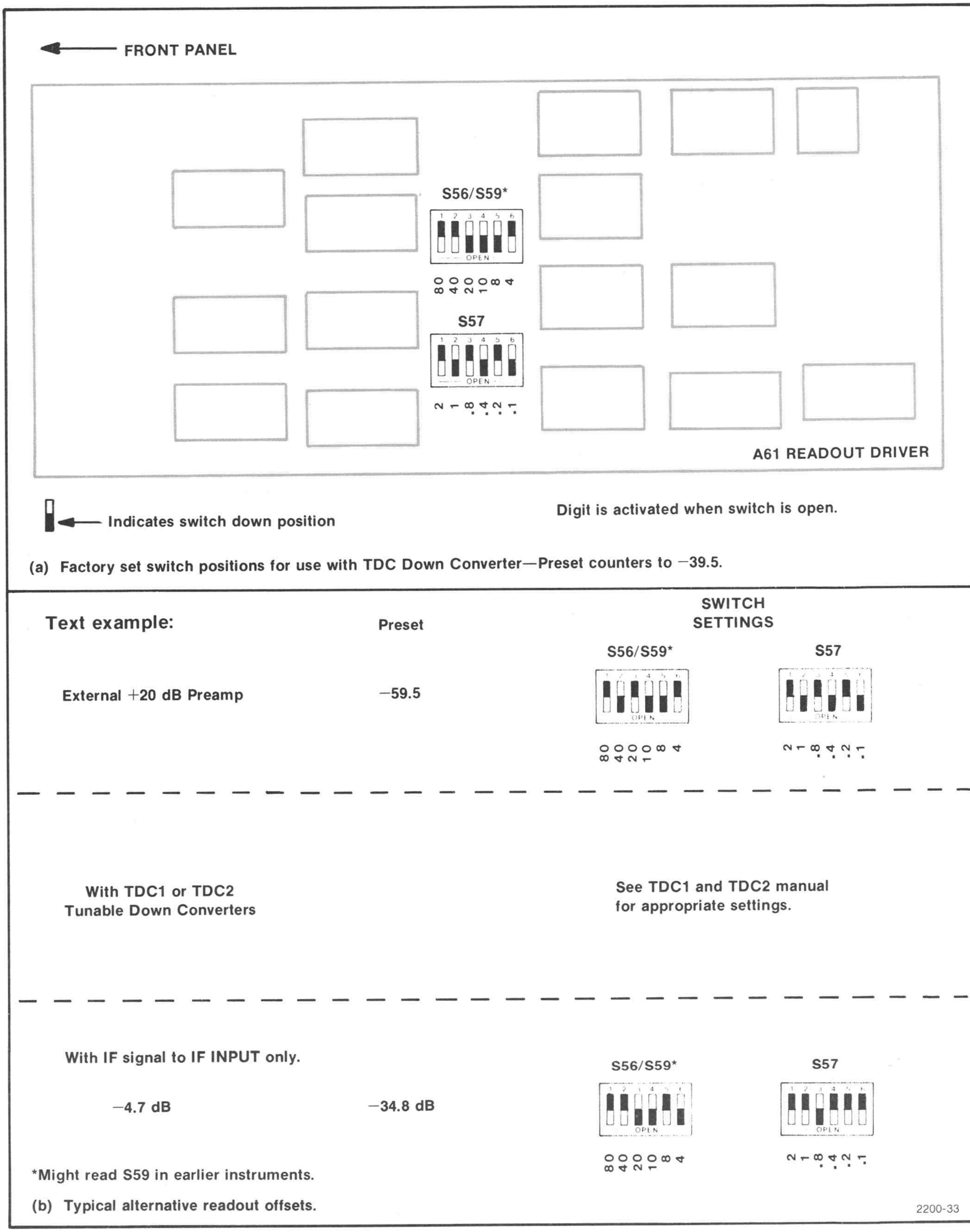


Fig. 3-16. Readout Offsets.

−15 V Supply

In the −15 V supply, the voltage at the base of Q73 holds at −6.2 V. Should the −15 V supply go more negative, Q72 conducts more current. This causes Q82 to increase conduction, reducing conduction in Q83 and Q95. This action reduces current flow to the −15 V bus, causing the supply to return to the preset level. The regulating circuitry for all three supplies is fast enough to respond to the 120 cycle ripple present from the rectifiers. Should the current from the supply passing through R91 exceed about 2 A, Q81 comes into conduction. This action causes Q82 to conduct, which reduces conduction in Q83, holding the current through Q95 to a safe value. The output impedance of Q72 and Q73 is matched to reduce unequal feedback from collectors to bases, resulting in increased ripple rejection. Loop compensation to prevent oscillation is provided by C84, C85 and R86. Constant voltage across R94, to reduce hum, is provided by VR73. The LED mounted on the power supply circuit board indicates when voltage is present on the −15 V bus.

+5 V Supply

The +5 V supply operates in a manner similar to the −15 V supply. Reference is obtained at the junction of R51 and R60. Should the +5 V increase in voltage, Q52B increases conduction, causing Q53 to increase conduction. Constant current is provided by Q54. This action reduces conduction in Q43, which in turn reduces conduction in Q34. If the current passing through R41 exceeds about 2 A, Q41 comes into conduction. This action reduces current flow through Q34 to a safe level. Turn on current for Q43 is provided by current source Q54, which also aids in ripple reduction. Loop compensation to prevent oscillations is provided by R44, C44 and C54. The 5 V winding on T10 is fused. This is necessary, as a shorted 5 V winding causes insufficient current in the pimary winding to open the primary fuse.

+15 V Supply

Reference for the +15 V supply is obtained through divider R20 and R21 connected to the −15 V supply. If the +15 V supply increases in voltage due to decreasing load, Q22B increases conduction. This action increases conduction in Q14 and reduces conduction in Q13 and Q05. The reduced current supplied to the decreased load lowers the voltage to the predetermined level. If more than about 2 A of current flows through R02, Q10 comes into conduction, limiting the current to a safe value. Loop compensation to stop oscillations is provided by C13, C14 and R15. Start up current for Q13 is provided by Q23 which, as a collector current source for Q14, also reduces ripple.

CALIBRATION

Introduction

The procedures in this section serve as guides to perform the calibration steps necessary to ensure the proper operation of the 1450-1 TELEVISION DEMODULATOR. Limits, tolerances, and waveforms appearing in this section are not instrument specifications except as listed in Section 1, Introduction and Specification.

The 1450-1 front- and rear-panel names are capitalized; e.g., RF IN. Control and connector names on test equipment and internal controls in the 1450-1 have only the first letter capitalized; e.g., Gain.

The capabilities of the test equipment listed are the minimum required to calibrate the 1450-1. If alternative equipment is used, it must meet or exceed the specifications of the listed equipment. Refer to Table 4-1 for test equipment needed to calibrate the 1450-1.

The 1450-1 power must be on for at least 1 hour before any measurements and/or adjustments are made.

The following calibration is in an orderly manner, and will result in a calibrated instrument within the specifications. Note that if an adjustable component is replaced in an LC filter, the filter may be severely misadjusted by the component replaced. In such a case, it is recommended that the adjustment step associated with the circuit board be performed, then perform the overall calibration.

The Calibration section is divided into two main parts: Performance Check and Adjustment Procedure. The Performance Check is preceded by a Recommended Test Equipment table and a short-form performance check procedure, while the Adjustment Procedure is preceded by a short-form adjustment procedure.

The table of contents at the front of this manual lists the page numbers of all the performance checks and adjustment steps.

Table 4-1

RECOMMENDED TEST EQUIPMENT

Description	Minimum Specification	Where Used	Equipment Used
Down Converter	Down Converter Vision IF must be the same as the 1450-1 IF Option	Performance Check and Calibration	TEKTRONIX TDC Down Converter
Test Modulator	0.1 dB Flatness within IF Band-pass Limits	Performance Check and Calibration	Tektronix Part Number 067-0899-00
Oscilloscope Mainframe	At least 50 MHz Bandwidth	Performance Check and Calibration	TEKTRONIX 7704
Differential Amplifier	At least 50 μV/div Sensitivity	Performance Check and Calibration	TEKTRONIX 7A22
Differential Comparator Plug-in	At least 20 MHz Bandpass	Performance Check and Calibration	TEKTRONIX 7A13
Dual-Trace Amplifier	At least 50 MHz Bandpass	Performance Check and Calibration	TEKTRONIX 7A18
Time Base Plug-in	5 ns/div to 5 s/div Calibrated Time Base	Return Loss	TEKTRONIX 7B53A
Spectrum Analyzer	3 kHz to 3 MHz Resolution in steps of 10	Performance Check and Calibration	TEKTRONIX 7L13
Tracking Generator	Compatible with the Spectrum Analyzer	Performance Check and Calibration	TEKTRONIX TR 502

Table 4-1 (cont)

Description	Minimum Specification	Where Used	Equipment Used
Power Supply Module	Capable of driving several loads	Performance Check and Calibration	TEKTRONIX TM 503 Option 07
Multimeter	0.1% accuracy	Performance Check and Calibration	TEKTRONIX DM 502
Frequency Counter	Compatible with TR 502	Performance Check and Calibration	TEKTRONIX DC 508 with Option 07
Low-Pass Filter	250 kHz	Calibration Quadrature	Tektronix Part No. 015-0352-00
Audio Oscillator	30 Hz to 20 kHz Distortion less than 0.035%	Performance Check and Adjustment	TEKTRONIX SG 502
Leveled Sine Wave Generator	250 kHz to 100 MHz Output Frequency Range	Performance Check and Calibration	TEKTRONIX SG 503
Function Generator	1 Hz to 100 Hz with DC Offset	Performance Check and Adjustment	TEKTRONIX FG 503
50 Ω Step Attenuator	50 dB in 10 dB Steps and 9 dB in Unit Steps	Performance Check and Adjustment	TEKTRONIX 2701
Sweep Generator	10 MHz to 100 MHz; Flat over 6 MHz	Performance Check and Adjustment	Wavetek Sweep/ Signal Generator
Audio Spectrum Analyzer	10 Hz to 3 kHz Resolution; 600 Ω Input; 5 kHz and 10 kHz Frequency Spans	Performance Check and Adjustment	TEKTRONIX 5L4N
Oscilloscope Mainframe	Compatible with Audio Analyzer	Audio Check and Adjustment	TEKTRONIX 5111
Full Field Signal Source	Color Bars, Linearity, 2T Pulse and Bar, and Field Sweep	Performance Check and Adjustment	TEKTRONIX 1410 With TSG1, TSG3, TSG5, and TSG6
Power Meter	−25 dBm to +20 dBm	Performance Check and Adjustment	HP 435A
Waveform Monitor	Display Field Rate and Line Rate Waveforms	Performance Check and Adjustment	TEKTRONIX 1480
Vectorscope	Differential Phase and Differential Gain Displays	Performance Check	TEKTRONIX 520A
8 Ω to 600 Ω Matching with Switchable 30-dB Pad	N/A	Performance Check and Adjustment	See Fig. 4-1
600 Ω/30-dB Pad	N/A	Performance Check and Adjustment	See Fig. 4-2
Filter	4.5 MHz Low Pass	Performance Check	See Fig. 4-3
Filter	1 kHz Low Pass	Performance Check	See Fig. 4-3
High-Frequency Return Loss Bridge	10 MHz to 1 GHz and 40 dB Directivity; 50 Ω input	IF IN Return Loss Check	Wiltron VSWR Bridge 62N50
Low Frequency Return Loss Bridge	54 dB; dc to 10 MHz; 75 Ω input	Return Loss Check	Tektronix Part Number 015-0149-00

Table 4-1 (cont)

Description	Minimum Specification	Where Used	Equipment Used
SMA Male-to-BNC Female	N/A	Performance Check	Tektronix Part Number 015-1018-00
Calibration Fixture	N/A	Video Low Pass Filter	See Fig. 4-3
BNC Male-to-Pin Jack Adapter Cable	N/A	IF Filter Flatness Adjustment	Tektronix Part Number 175-1178-00

NOTE

An SMA Male-to-BNC Female Adapter (015-1018-00) must be used when making frequency measurements with the DC 508 Option 07, TR 502, and 7L13 combination. This adapter does not come with either the DC 508 Option 07 or the TR 502, and must be ordered separately.

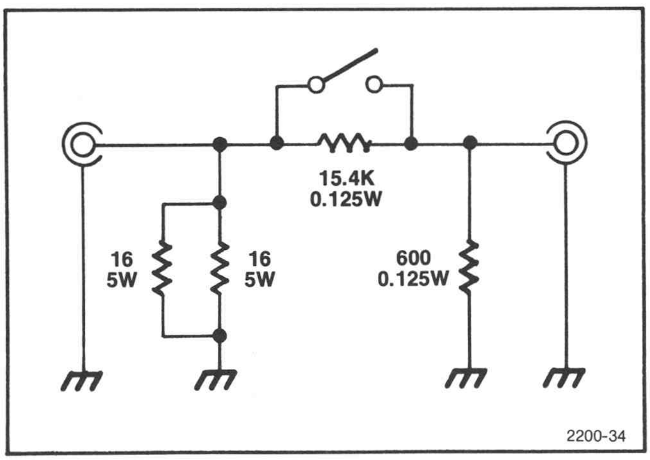


Fig. 4-1. 8 Ω to 600 Ω Impedance Matching Calibration Fixture with Switchable 30 dB Attenuator.

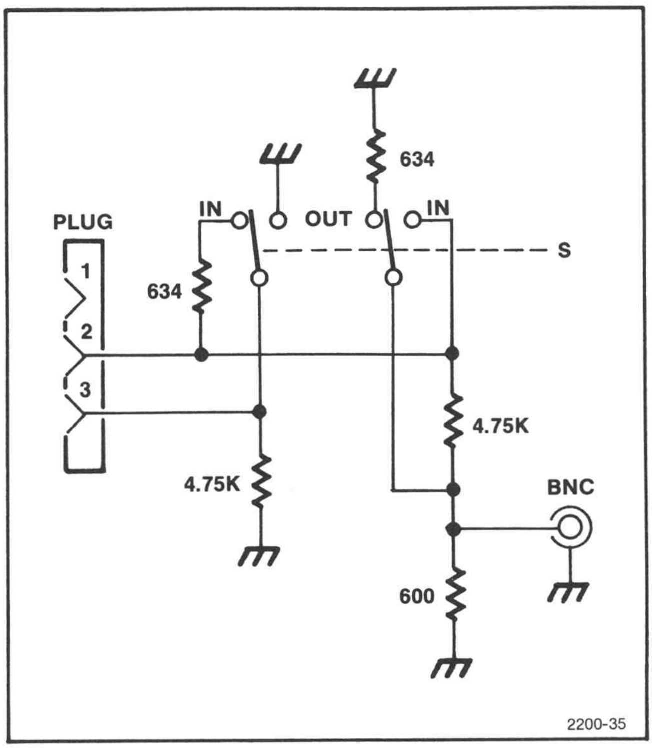
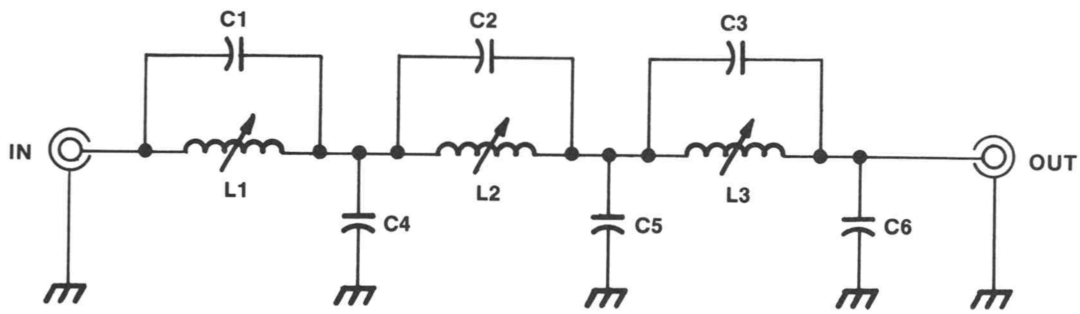
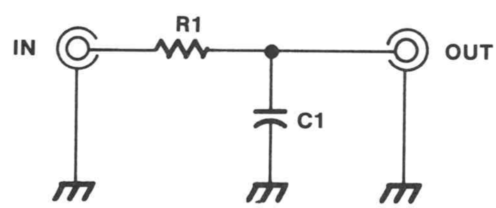


Fig. 4-2. 600 Ω Audio Output Calibration Fixture with Switchable 30 dB Attenuator.



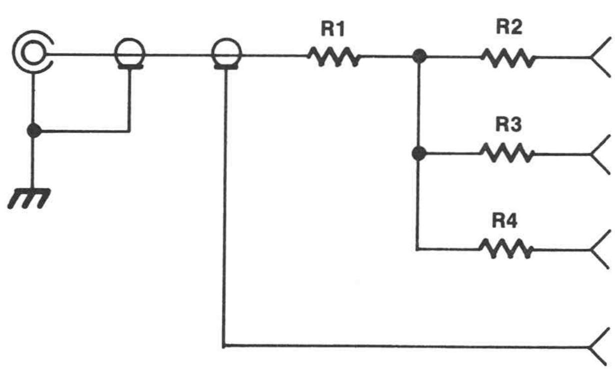
C1	528 pF	L1	1—3 μH SET AT 1.621 μH	(5.44 MHz)
C2	560 pF	L2	2—6 μH SET AT 2.234 μH	(4.5 MHz)
C3	105 pF	L3	2—6 μH SET AT 2.771 μH	(9.33 MHz)
C4	545 pF			
C5	560 pF			
C6	253 pF			

(a) 4.5 MHz Low Pass Filter



C1	0.01 μF
R1	1.5 kΩ

(b) 1 kHz Low Pass Filter



R1	16.5
R2	75.0
R3	53.6
R4	75.0

(c) Video Low Pass Filter Calibration Fixture

2200-36

Fig. 4-3. Calibration Fixtures (Low Pass Filters).

@

PERFORMANCE CHECK

SHORT FORM PERFORMANCE CHECK

Table 4-2

DE-EMPHASIS AUDIO FREQUENCY RESPONSE

Frequency	Response
1.0 kHz	−0.87 dB
2.122 kHz	−3 dB
4.0 kHz	−6.58 dB
6.0 kHz	−9.54 dB
10.0 kHz	−13.66 dB
12.0 kHz	−15.18 dB
15.0 kHz	−17.07 dB
18.0 kHz	−18.63 dB
20.0 kHz	−19.53 dB

The word "SYSTEM" in this section refers to a 1450-1 with a TEKTRONIX TDC Down Converter installed. All SYSTEM specifications will be satisfied only when both the 1450-1 and the TDC are fully calibrated.

PERFORMANCE CHECK

1. Check Power-Supply Ripple

a. Line voltage capabilities of the 1450-1 can be selected with a circuit card located in the power cord receptacle at the rear of the instrument. Caution should be exercised to ensure that the correct line fuse is installed in the instrument. Select the proper line voltage and range, and proceed.

b. Check that power-supply ac ripple is 1 mV P-P or less. Check power-supply ac ripple across the voltage range according to Table 4-3.

NOTE

Refer to the installation instructions in Section 2 for information relating to Line Voltage selection and fuse data. This information may also be obtained from schematic diagram 14, Power Supply. Table 4-3 lists all the possible line voltage ranges.

Table 4-3

POSSIBLE LINE VOLTAGE RANGES

Line	Range	
115 V	LOW	90 V — 110 V
	HIGH	108 V — 132 V
230 V	LOW	198 V — 242 V
	HIGH	216 V — 250 V

2. Check Adjacent Channel Cross-Modulation

a. Refer to Fig. 4-4. The frequencies of the two generators must be set up with a frequency counter such as in the HP 8640B or a DC 508. The power levels at the 1450-1 IF IN are critical, and must be set up with a 7704/7L13 Spectrum Analyzer combination. The 7L13 Center Frequency may be set to view any of the three signals individually, then changed to 1 MHz to do the check.

b. Connect the test equipment as shown in Fig. 4-4, except that the cable connecting to the 1450-1 IF IN is connected to the 7L13 RF In connector to set up the power levels. After the power levels are set up, disconnect the cable from the 7L13 RF In and connect it to the 1450-1 IF IN connector.

c. Check that the amplitude of the cross-modulation pulse appearing 1 MHz above zero is −61 dBm (60 dB down).

3. Check IF Input Level Range

a. Connect the test equipment as shown in Fig. 4-5. Set the 2701 Step Attenuator such that the 1450-1 RF SIGNAL INPUT LEVEL readout indicates −25 dBm. Set VIDEO OUTPUT back porch at the 0 IRE graticule line on the 1480, and note the video amplitude.

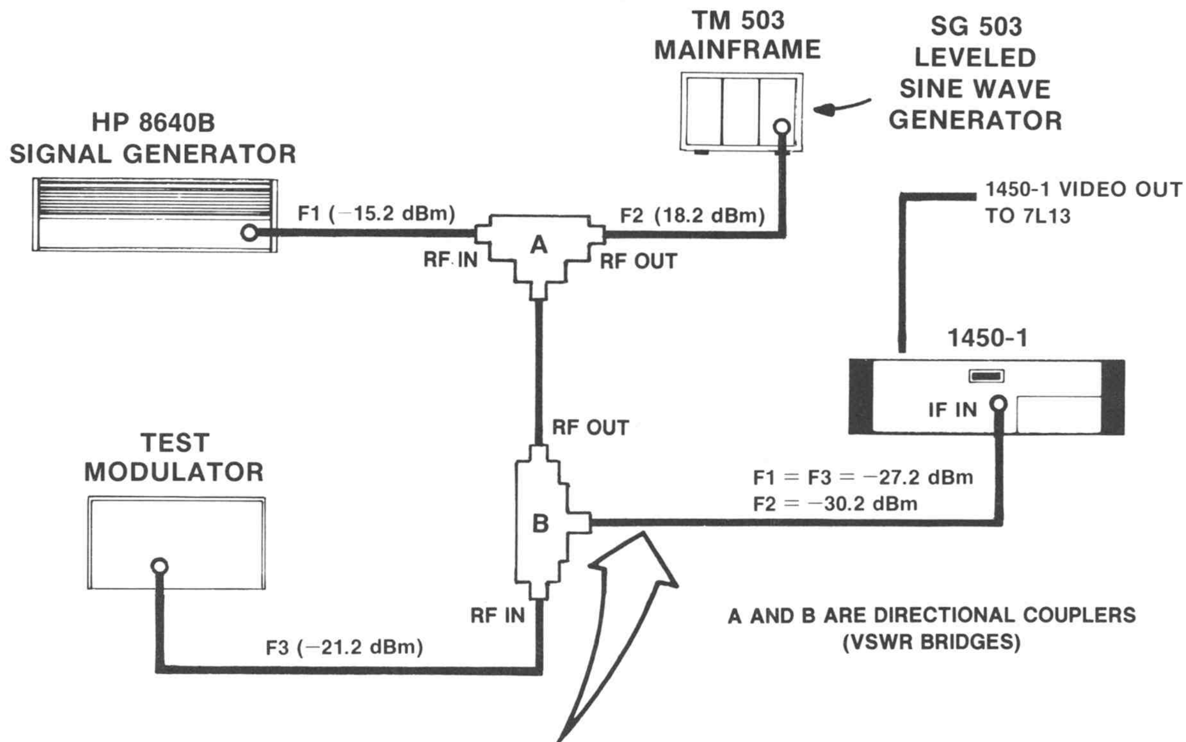
b. Slowly add attenuation to the modulator IF signal, using the 2701.

c. Check that the VIDEO OUT amplitude and back porch dc level remain constant between −25 dBm and −69 dBm indicated RF signal input levels.

4. Check Visual IF Frequency Range

a. Connect the test equipment as shown in Fig. 4-6. Vary the HP 8640B frequency 120 kHz above and below the visual IF frequency of the 1450-1.

b. Check that the UNLOCKED light on the 1450-1 front panel remains off except for momentary unlock while the visual IF is being changed. Vary the HP 8640B frequency more than 120 kHz above and below the visual IF frequency of the 1450-1, and check that the UNLOCKED light on the 1450-1 front panel comes on at some frequency beyond 120 kHz, typically 250 kHz.



	CHANNEL CARRIER (F3)	ADJACENT CARRIER (F1)	ADJACENT SIDEBAND (F2)
	45.75 MHz	51.75 MHz (UPPER) 39.75 MHz (LOWER)	50.75 MHz (UPPER) 38.75 MHz (LOWER)
	38.9 MHz	44.9 MHz (UPPER) 32.9 MHz (LOWER)	43.9 MHz (UPPER) 31.9 MHz (LOWER)
	37.0 MHz	43.0 MHz (UPPER) 31.0 MHz (LOWER)	42.0 MHz (UPPER) 30.0 MHz (LOWER)
POWER	−27.2 dBm	−27.2 dBm	−30.2 dBm

NOTE: POWER LEVELS ARE CRITICAL AND MUST BE CALIBRATED WITH POWER METER

7L13 SPECTRUM ANALYZER

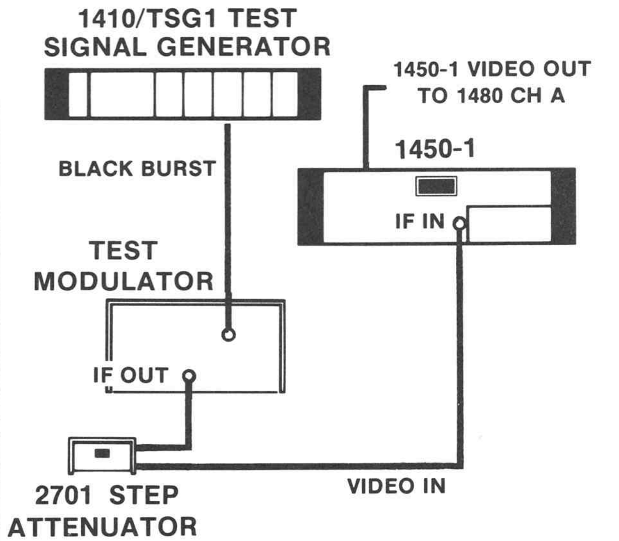
REFERENCE LEVEL .... −10 dBm
RF dB .... 20 dB
LOG .... 10 dB/Div
CENTER FREQUENCY .... 1 MHz
FREQ SPAN/DIV .... 20 kHz
AUTO PHASE LOCK .... ON
RESOLUTION .... 30 kHz
300 Hz VIDEO FILTER .... ON

1450-1

DETECTION MODE .... SYNCHRONOUS
SYNCHRONOUS TIME CONSTANT .... SLOW
INTERNAL ZERO CARRIER REF .... OFF
MANUAL AGC .... ON
MANUAL GAIN .... FULLY COUNTER-CLOCKWISE

2200-37A

Fig. 4-4. Equipment Setup to Check Mainframe Adjacent Channel Cross-Modulation.



1410/TSG1 TEST SIGNAL GENERATOR

Y	ON
B-Y	ON
R-Y	ON

1450-1

DETECTION MODE	CONT
SOUND TRAP	IN
INTERNAL ZERO CARRIER REF	OFF
AUTO AGC	BACK PORCH

1480 WAVEFORM MONITOR

RESPONSE	FLAT
INPUT	A DC CPL'D
VOLTS FULL SCALE	1.0
MAG	OFF
DISPLAY	10 μs
LINE SELECTOR	OFF
DC RESTORER	OFF
SYNC	INT

2200-38

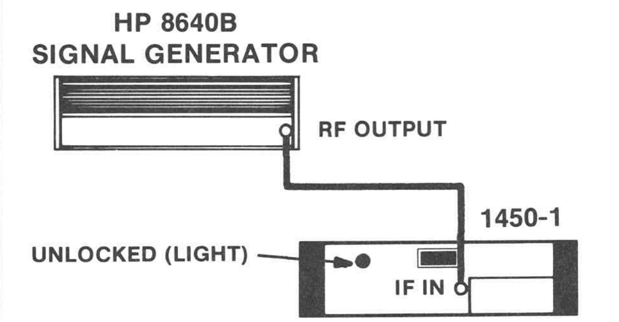
Fig. 4-5. Equipment Setup to Measure IF Input Level Range.

5. Check AGC Speed

a. Drive the 1450-1 IF IN with a carrier signal from an HP 8640B. Set the HP 8640B output level at −25 dBm. Drive the HP 8640B AM input with a 10 Hz/1 V sine wave signal, and set the HP 8640B for 20% modulation.

b. Monitor the 1450-1 VIDEO OUTPUT with a waveform monitor. Set the waveform monitor to display a 2 Field signal at 0.2 V Full Scale. Push in the 1450-1 (SYNCHRONOUS DETECTION MODE) CONT and BACK PORCH (AUTO AGC) buttons.

c. Set the 1450-1 AGC SPEED control to FAST.



HP 8640B SIGNAL GENERATOR

FREQUENCY TUNE	1450-1 IF
OUTPUT LEVEL	−20 dBm

1450-1

DETECTION MODE	CONT (IN)
AUTO AGC	BACK PORCH

2200-39

Fig. 4-6. Setup for Checking IF Frequency Range.

d. Check that the 10 Hz signal is not displayed.

e. Set the 1450-1 AGC SPEED control to SLOW.

f. Check to see that the 10 Hz signal is displayed.

6. Check Synchronous Time Constant

a. Frequency-modulate an HP 8640B with a 100 Hz signal from an SG 502. Use the HP 8640B as the local oscillator for the test modulator; that is, connect the HP 8640B RF output to the test modulator LO In connector. Set the HP 8640B frequency for the channel LO of the down converter used in the 1450-1, and set the output level at −5 dBm.

LO Frequency = Channel Visual Carrier + Visual IF

b. Set the test modulator visual carrier on. Drive the test modulator video input with a linearity signal from a test signal generator, and connect the test modulator RF Out to the 1450-1 RF IN connector.

c. Install a down converter in the 1450-1 and make the appropriate front-panel cable connections to complete the SYSTEM. Push in the 1450-1 CONT (DETECTION MODE), SOUND TRAP IN, (INTERNAL ZERO CARRIER REF) ON, and BACK PORCH (AUTO AGC) buttons. Set the 1450-1 SYNCHRONOUS TIME CONSTANT control in SLOW.

@

d. Connect the 1450-1 QUADRATURE OUTPUT to a 1480 External Horizontal input through a low-pass filter, and connect the VIDEO OUTPUT to the 1480 Ch A input. Set the 1480 Response in Low Pass, Input in Ch A, Volts Full Scale at 1.0, Mag at X25 (.2), and Display in Ext.

e. Refer to Fig. 4-7. Set deviation on the HP 8640B to match the waveform in Fig. 4-7a. Alternately push in the 1450-1 SYNC TIP, BACK PORCH, and CONT (SYNCHRONOUS DETECTION MODE) buttons while switching the SYNCHRONOUS TIME CONSTANT control through SLOW, NORM, and FAST.

f. Check that the 1480 displays match the displays in Fig. 4-7.

7. Check Sync Stripper Range

a. Drive the test modulator with composite video. Set the test modulator visual carrier for −20 dBm of IF output signal.

b. Drive the 1450-1 IF IN with −20 dBm from the test modulator. Push in the 1450-1 CONT (SYNCHRONOUS DETECTION MODE), INTERNAL ZERO CARRIER REF, and MAN (AGC) buttons. Set the 1450-1 manual GAIN control for a normal signal (High/Low lights on the RF SIGNAL INPUT LEVEL readout off).

c. Monitor the 1450-1 VIDEO OUT with a waveform monitor set to view line 20. Note the Internal Zero Carrier Reference pulse amplitude. Add 20 dB of attenuation to the 1450-1 IF IN signal.

d. Check that the Internal Zero Carrier Reference pulse position and timing is the same as before.

8. Check VIDEO OUTPUT Levels (0 V ±100 mV Back Porch) (Back Porch = Zero Carrier −1.714 V ±34 mV) (Sync Tip = Back Porch −572 mV ±11 mV) (Sync Tip = Zero Carrier −2.286 V ±46 mV)

NOTE

Values apply to unterminated outputs. For terminated outputs, divide values by 2.

a. Inject composite sync into pin 16 of U24 on A60 by connecting composite sync from a test signal generator to R26 (5.1 kΩ) through a 100 kΩ resistor. Push in the 1450-1 (SYNCHRONOUS DETECTION MODE) CONT, SOUND TRAP IN, and BACK PORCH AUTO AGC buttons.

b. Drive the 1450-1 IF Input with visual IF carrier from the test modulator.

c. (1) Monitor the VIDEO OUTPUT with a dc voltmeter (unterminated), and note the DM 502 reading (0 V ±100 mV). This is the back porch dc level.

(2) Push in the SYNC TIP AUTO AGC button on the 1450-1, aand note the DM 502 reading. This is the sync tip dc level.

(3) Push in the 1450-1 MANual (GAIN) button, and set the MANual GAIN control fully counterclockwise. Note the DM 502 reading. This is the zero carrier dc level.

d. Check that the back porch dc level is 1.714 V ±34 mV less than the zero carrier dc level.

e. Check that the sync tip dc level is 572 mV ±11 mV less than the back porch dc level, and is 2.286 V ±46 mV less than the zero carrier dc level.

9. Check Short Time Distortion

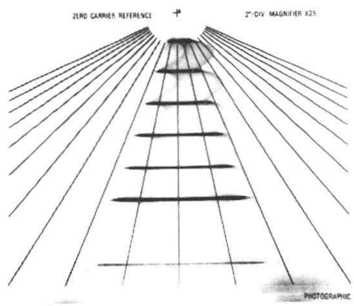
a. Connect the test equipment as shown in Fig. 4-8. Be sure that graticule 'B' is installed in the 1480 Waveform Monitor. Use the 1480 position controls to position the leading edge of the Bar to the center vertical graticule line and the top of the Bar to the 100 IRE graticule line.

b. Reset the 1480 Volts Full Scale to 0.2. Be sure not to disturb the Horizontal Position control after it is set. Reset the Vertical Position control to align the top of the Bar to the 100 IRE graticule line.

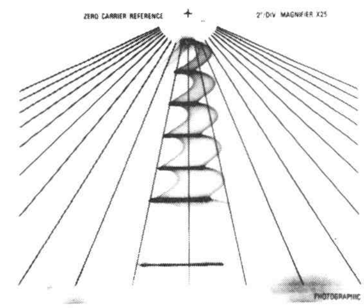
c. Check that the leading edge of the Bar is within 0.5% of the center vertical graticule line.

d. Reset the Vertical Position control to align the bottom of the Bar with the 0 IRE graticule line.

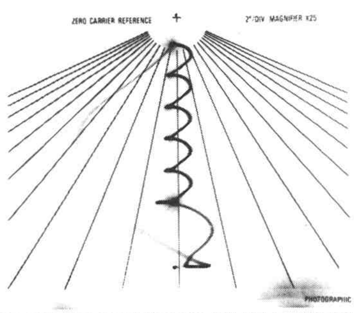
e. Check that the leading edge of the Bar is within 0.5% of the center vertical graticule line.



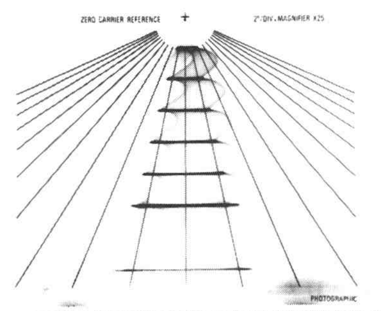
SLOW TIME CONSTANT
ALL SYNCHRONOUS DETECTION MODES



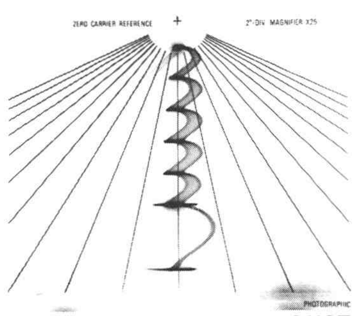
NORM SYNCHRONOUS TIME CONSTANT
CONTINUOUS SYNCHRONOUS DETECTION MODE



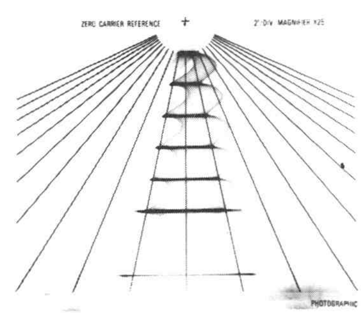
FAST SYNCRHONOUS TIME CONSTANT
CONTINUOUS SYNCHRONOUS DETECTION MODE



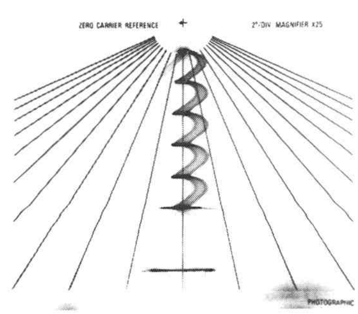
NORM SYNCHRONOUS TIME CONSTANT
SYNC TIP SYNCHRONOUS DETECTION MODE



FAST SYNCHRONOUS TIME CONSTANT
SYNC TIP SYNCHRONOUS DETECTION MODE



NORM SYNCHRONOUS TIME CONSTANT
BACK PORCH SYNCHRONOUS DETECTION MODE

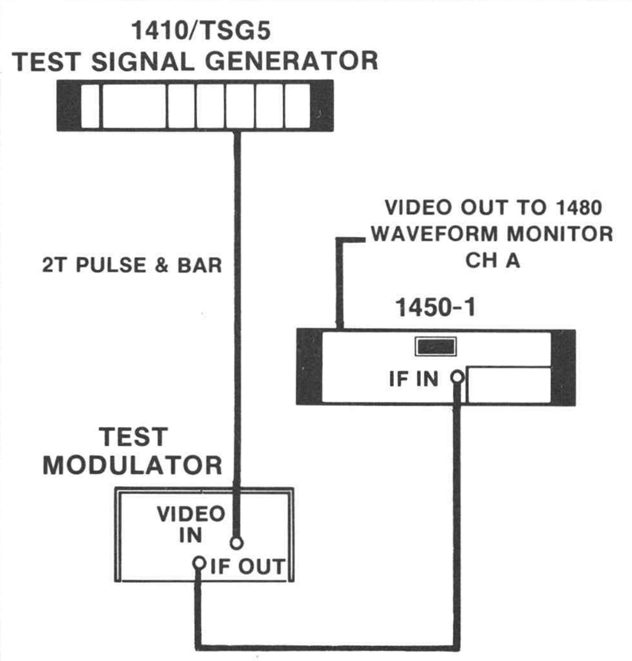


FAST SYNCHRONOUS TIME CONSTANT
BACK PORCH SYNCHRONOUS DETECTION MODE

2200-40

Fig. 4-7. Synchronous Time Constant Effects.

@



1410/TSG5 TEST SIGNAL GENERATOR

MOD BUTTON	IN
2T PULSE BUTTON	IN
2T BAR BUTTON	IN

1480 WAVEFORM MONITOR

INPUT	CH A
VOLTS FULL SCALE	1.0
MAG	OFF
DISPLAY	5 μs

TEST MODULATOR

VISUAL CARRIER	ON
AURAL CARRIER	OFF

1450-1

SYNCHRONOUS DETECTION MODE	BACK PORCH
SOUND TRAP	IN
AUTO AGC	BACK PORCH

2200-41

Fig. 4-8. Equipment Setup to Check Short Time Distortion and Chrominance-to-Luminance Delay.

10. Check K2T Distortion

a. Connect the test equipment as shown in Fig. 4-8. Install Graticule 'B' in the 1480. Position the Pulse and Bar back porch at the 0 IRE graticule line on the 1480, and position the 2T Pulse at the center of the graticule.

b. Change the 1480 Volts Full Scale to 0.2, and set the Mag at 0.2 (X25). Use the 1480 Vertical Position control to set the back porch level at 0 IRE if needed.

c. Check that the 2T Pulse distortion is within 0.5%.

11. Check Line Time Distortion

a. Connect the test equipment as shown in Fig. 4-8. Be sure that graticule 'A' is installed in the 1480 Waveform Monitor. Set the 1480 Volts Full Scale at 1 V, and adjust the 1450-1 MANual GAIN control for a 0 to 100 IRE excursion of the Pulse and Bar waveform. Reset the 1480 Volts Full Scale to 0.2. Position the top of the Bar as in Fig. 4-9.

b. Check that Line Time Distortion is within 0.5% with the 1450-1 SOUND TRAP OUT and in any SYNCHRONOUS DETECTION MODE. That is, the top of the Bar lies within the smaller divisions.

c. Push in the 1450-1 SOUND TRAP IN button and any of the SYNCHRONOUS DETECTION MODE buttons.

d. Check that Line Time Distortion is within 1%.

e. Push in the 1450-1 ENV DETECTION MODE button.

f. Check that Line Time distortion is within 1%.

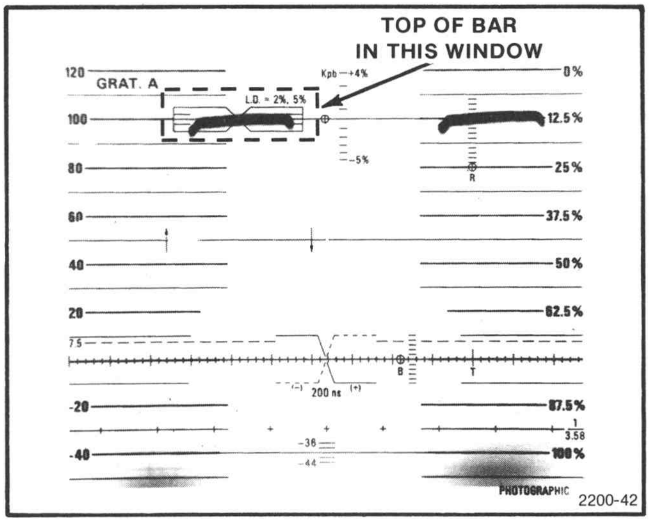


Fig. 4-9. Waveform Position for Checking Line Time Distortion.

12. Check "K" Factor (Kpb) Pulse and Bar Ratio

a. Connect the test equipment as shown in Fig. 4-8. Install Graticule 'A' in the 1480. Use the 1480 Vertical Position control to set the Pulse and Bar back porch at the 0 IRE graticule line on the 1480, and use the Horizontal Position control to set the 2T Pulse on the Kpb graticule divisions. Push in the 1450-1 MAN button and set the Bar amplitude at the 100 IRE graticule line on the 1480 using the 1450-1 GAIN control.

b. Change the 1480 Volts Full Scale to 0.2, and position the top of the Bar at the 100 IRE graticule line using the 1480 Vertical Position control. The Kpb scale is now calibrated for 0.2%/div.

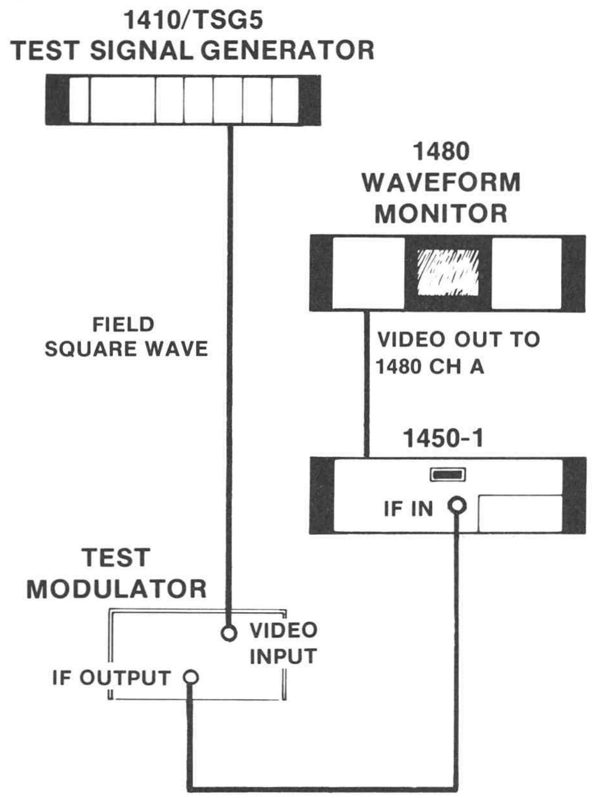
c. Check that the 2T Pulse is within 0.5% of the 100 IRE graticule line as read on the Kpb scale.

13. Check Field Time Distortion

a. Connect the test equipment as shown in Fig. 4-10. Make sure that graticule 'A' is installed in the 1480. Use the 1450-1 MANual GAIN control to set the field square-wave amplitude on the 1480 such that back porch is at 0 IRE and peak white is at 100 IRE.

b. Reset the 1480 Volts Full Scale to 0.2. Position the center of the top of the field square wave at the center of the measurement area.

c. Check that tilt of the field square-wave top is less than 0.5%.



1410/TSG5 TEST SIGNAL GENERATOR

FIELD SQ WAVE BUTTON . . . . IN

1450-1

SYNCHRONOUS DETECTION MODE . BACK PORCH
SOUND TRAP . . . . IN
AGC . . . . MAN IN

TEST MODULATOR

VISUAL CARRIER . . . . ON
AURAL CARRIER . . . . OFF

1480 WAVEFORM MONITOR

RESPONSE . . . . FLAT
INPUT . . . . CH A
VOLTS FULL SCALE 1.0
DISPLAY . . . . 2 FIELD

2200-43

Fig. 4-10. Equipment Setup to Check Field Time Distortion.

14. Check Chrominance-to-Luminance Delay

a. Connect the test equipment as shown in Fig. 4-10. Use graticule 'A' on the 1480. Set the 1450-1 MANual GAIN control for a normal display on the 1480 Waveform Monitor; that is, back porch at 0 IRE and peak white at 100 IRE.

b. Reset the 1480 Volts Full Scale control to 0.2. Chrominance-to-Luminance delay can be determined by measuring the baseline errors on the modulated 12.5T pulse. The sum of the left peak (Y1) and right peak (Y2) in Fig. 4-11 will be 1 IRE P-P for every 10 ns delay on the 12.5T pulse. Thus at 0.2 Volts Full Scale, delay time is:

$$t = 10 \text{ ns } \frac{(Y1 + Y2)}{5}$$

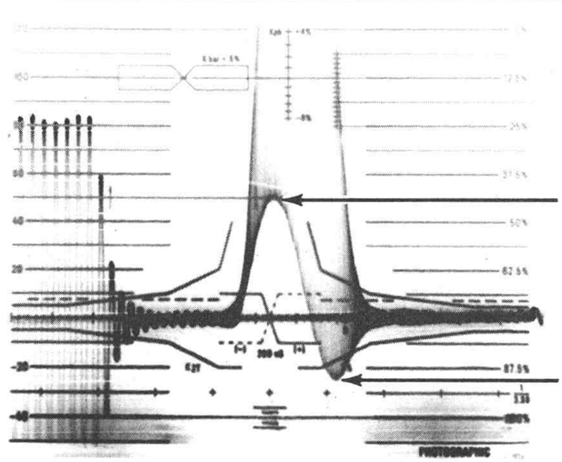
$$= 2\,(Y1 + Y2) \text{ ns.}$$

Make sure that the 1450-1 is in wide-band mode (SOUND TRAP OUT button pushed in).

c. Check that chrominance-to-luminance delay is 20 ns or less.

d. Push in the 1450-1 SOUND TRAP IN button, and insert pre-correction at the test modulator (170 ns for the Tektronix test modulator).

e. Check that chrominance-to-luminance delay is 20 ns or less.



NOTE: THIS WAVEFORM HAS BEEN EXAGGERATED FOR ILLUSTRATION PURPOSES

2200-44

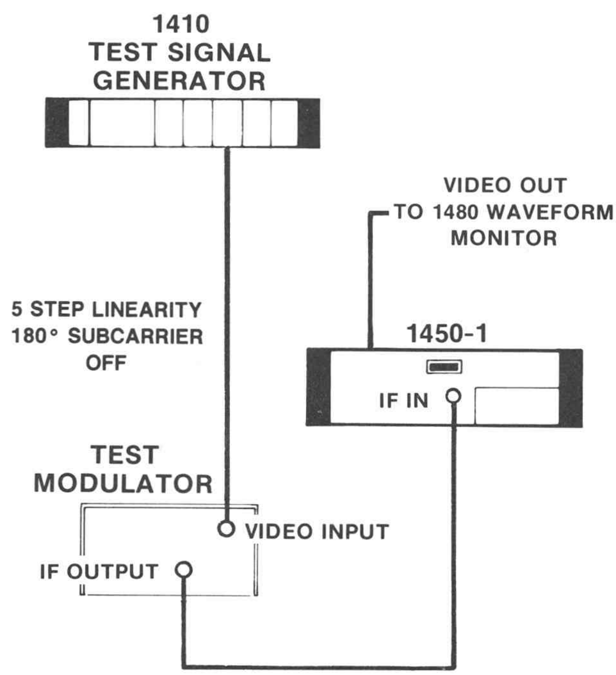
Fig. 4-11. Waveform for Checking Chrominance-to-Luminance Delay.

15. Check Line Time Non-linearity

a. Connect the test equipment as shown in Fig. 4-12. Install graticule 'A' in the 1480.

b. Adjust the 1480 Var Volts Full Scale control for 100 IRE Unit amplitude of the largest differentiated step. Use the 1480 Horizontal Position control to position the smallest step at the "R" scale on the graticule. This scale is now calibrated for 2%/div.

c. Check that the amplitude of the smallest differentiated step is within 1% of the 100 IRE graticule line. Check non-linearity in all detection modes, and both wide-band and narrow-band modes. See Fig. 4-13.



TEST MODULATOR

VISUAL CARRIER .... ON
AURAL CARRIER .... OFF

1480 WAVEFORM MONITOR

RESPONSE .... DIFF'D STEP
INPUT .... A
VOLTS FULL SCALE 1.0
DISPLAY .... 5 μs

1450-1

DETECTION MODE .... ENV (IN)
SOUND TRAP .... IN (IN)
AUTO AGC .... BACK PORCH

2200-45A

Fig. 4-12. Equipment Setup to Measure Line Time Non-linearity.

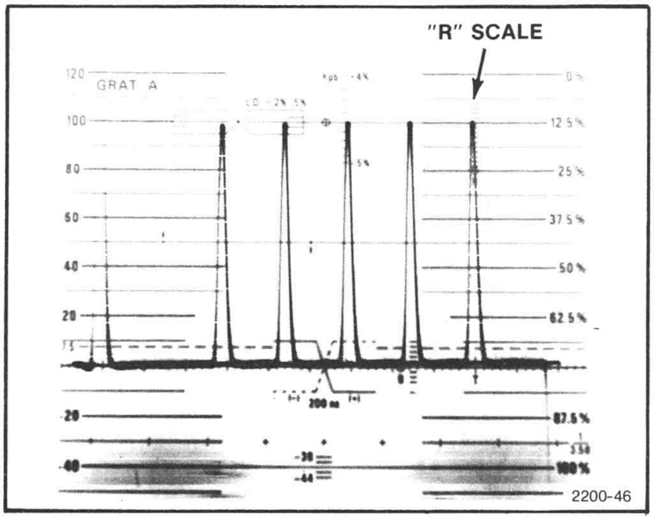
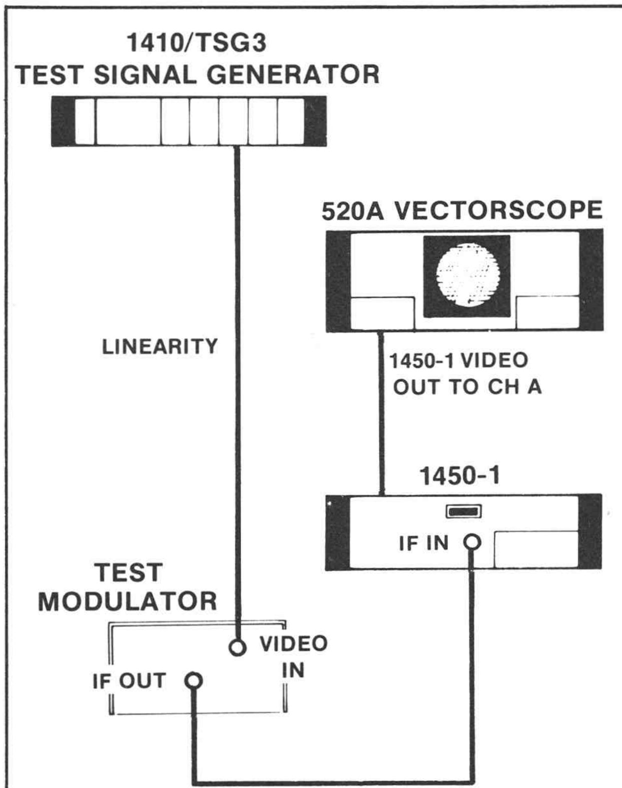


Fig. 4-13. Waveform for Measuring Line Time Non-linearity.



1450-1

SYNCHRONOUS DETECTION MODE
SOUND TRAP . . . . IN
AUTO AGC . . . . BACK PORCH

1410/TSG3 TEST SIGNAL GENERATOR

SET TSG3 FOR 10 STEP LINEARITY SIGNAL—ADJUST TSG3 FOR 80 IRE LUMINANCE

520A VECTORSCOPE

DIFF GAIN BUTTON . . . . IN
100%—75% MAX . . . . MAX
CH A BUTTON . . . . IN

TEST MODULATOR

VISUAL CARRIER . . . . ON
AURAL CARRIER . . . . OFF

2200-47

Fig. 4-14. Equipment Setup to Check Differential Gain.

16. Check Differential Gain

a. Connect the test equipment as shown in Fig. 4-14. Use the Ch A Phase control on the 520A to align the 180° subcarrier vector with the 180° graticule line. Disregard the burst vector.

b. Set the Channel A 100%—75%—Max Gain switch on the 520A at Max Gain, and adjust the Vertical Position Clamp and Horizontal Position Clamp controls to center the vector origin.

c. Adjust the 520A Channel A Gain control to set the 180° subcarrier at the circumference of the graticule circle, and readjust the Channel A Phase control to align the 180° subcarrier vector with the 180° graticule line.

d. Push in the Diff Gain button on the 520A, and use the Vertical Position control to position the first luminance step at the 0% Diff Gain graticule line for a reference.

e. Check that the rest of the luminance steps are within 1% or less of the reference step.

f. Push in the ENV DETECTION MODE button on the 1450-1 front panel, and reset the reference luminance step at the 0% Diff Gain graticule line.

g. Check that the rest of the luminance steps are within 4% of the reference step. See Fig. 4-15.

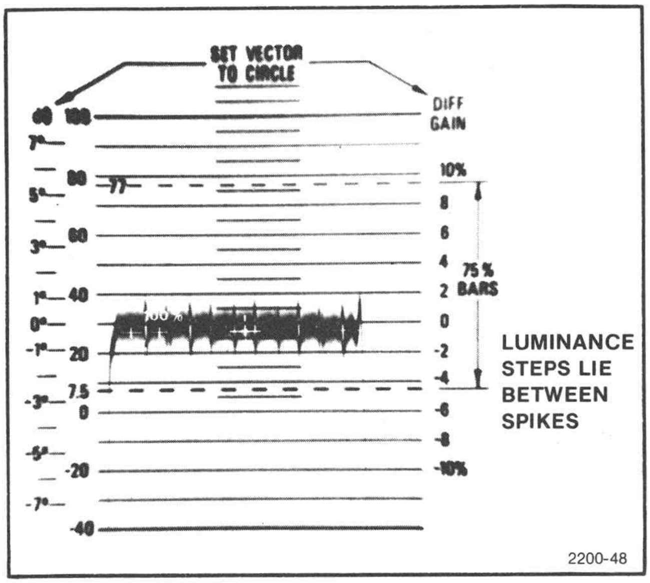


Fig. 4-15. Waveform for Checking Differential Gain.

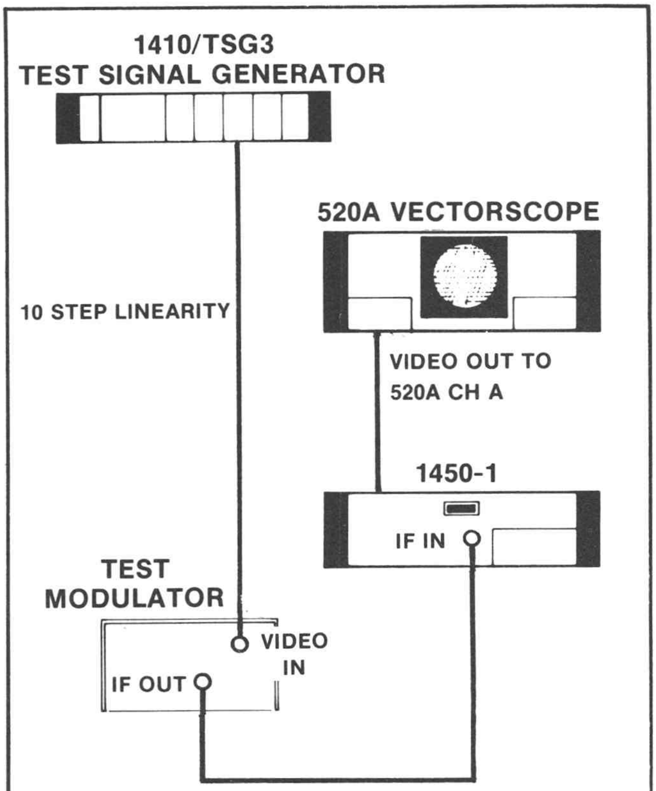
17. Check Differential Phase

a. Connect the test equipment as shown in Fig. 4-16. Use the Channel A Phase control on the 520A to align the 180° subcarrier vector with the 180° graticule line. Disregard the burst vector.

b. Set the Channel A 100%—75%—Max Gain switch on the 520A to Max Gain, and adjust the Vertical Position Clamp and Horizontal Position Clamp controls to center the vector origin.

c. Push in the Diff Phase button on the 520A, and set the Diff Phase Display switch to Double. Set the Calibrated Phase control to indicate 0°, and use the Channel A Phase control to overlay the first luminance steps on the 520A display. See Fig. 4-17.

d. Check differential phase by adjusting the Calibrated Phase control on the 520A to overlay the steps that are farthest apart. Read the differential phase directly on the Calibrated Phase indicator. Check that differential phase is 1° or less.



1410/TSG3 TEST SIGNAL GENERATOR

SET TSG3 FOR 10 STEP LINEARITY SIGNAL WITH 180° SUBCARRIER ON

1450-1

SYNCHRONOUS DETECTION MODE .... CONT
SOUND TRAP .... OUT
AUTO AGC .... BACK PORCH

TEST MODULATOR

VISUAL CARRIER .... ON
AURAL CARRIER .... OFF

520A VECTORSCOPE

CH A .... IN
FULL FIELD .... IN
AØ .... IN
VECTOR .... IN
CHANNEL A VECTORS 75%

2200-49

Fig. 4-16. Equipment Setup to Check Differential Phase.

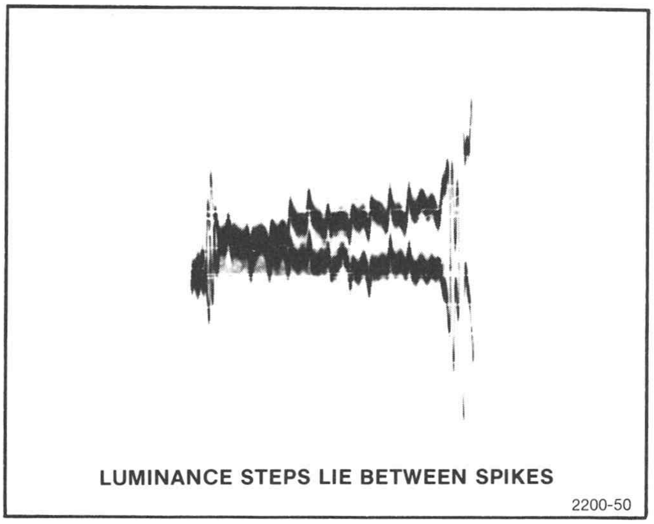


Fig. 4-17. Waveform for Checking Differential Phase.

18. Check Aural Signal Rejection

a. Connect the test modulator IF Out to the 1450-1 IF IN connector, and connect the 1450-1 INTERCARRIER OUT to a DC 508 Counter. Set the test modulator visual and aural carriers on. Set the test modulator center frequency such that the DC 508 indicates 4.5 MHz.

b. Connect the test equipment as shown in Fig. 4-18. Push in the 1450-1 CONT DETECTION MODE, SOUND TRAP OUT, and BACK PORCH AGC buttons. Set the test modulator visual and aural carriers on, and note the audio amplitude on the 7L13 display. See Fig. 4-19.

c. Push in the SOUND TRAP IN button.

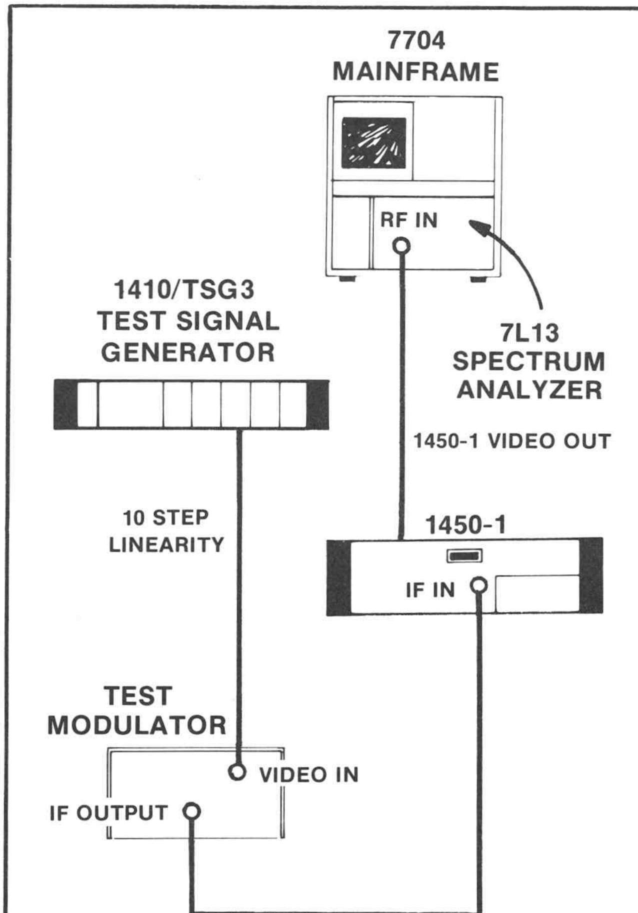
d. Check that the audio amplitude is now at least 60 dB less than was noted before.

19. Check Low Frequency Signal-to-Noise Ratio

a. Connect the test equipment as shown in Fig. 4-20. Check that the 1480 displays a 1 V video signal (−40 IRE to 100 IRE).

b. Turn the 1410 power off, and set the 1480 Volts Full Scale at 0.2.

c. Check that the low-frequency noise displayed on the 1480 is less than 0.5 IRE P-P.



1410/TSG3 TEST SIGNAL GENERATOR

SET FOR 10 STEP LINEARITY SIGNAL WITH 180° SUBCARRIER

1450-1

SYNCHRONOUS DETECTION MODE	BACK PORCH
SOUND TRAP	OUT
AUTO AGC	BACK PORCH

TEST MODULATOR

AURAL CARRIER	ON
VISUAL CARRIER	ON

7L13 SPECTRUM ANALYZER

REFERENCE LEVEL	+10 dBm
LOG (VERT)	10 dB/DIV
TIME/DIV	10 ms
FREQ SPAN	1 MHz
RESOLUTION	300 kHz
CENTER FREQUENCY	1 MHz

CENTER FREQUENCY SET TO POSITION AURAL CARRIER IN THE VIEWING AREA.

2200-51

Fig. 4-18. Equipment Setup to Check Aural Signal Rejection.

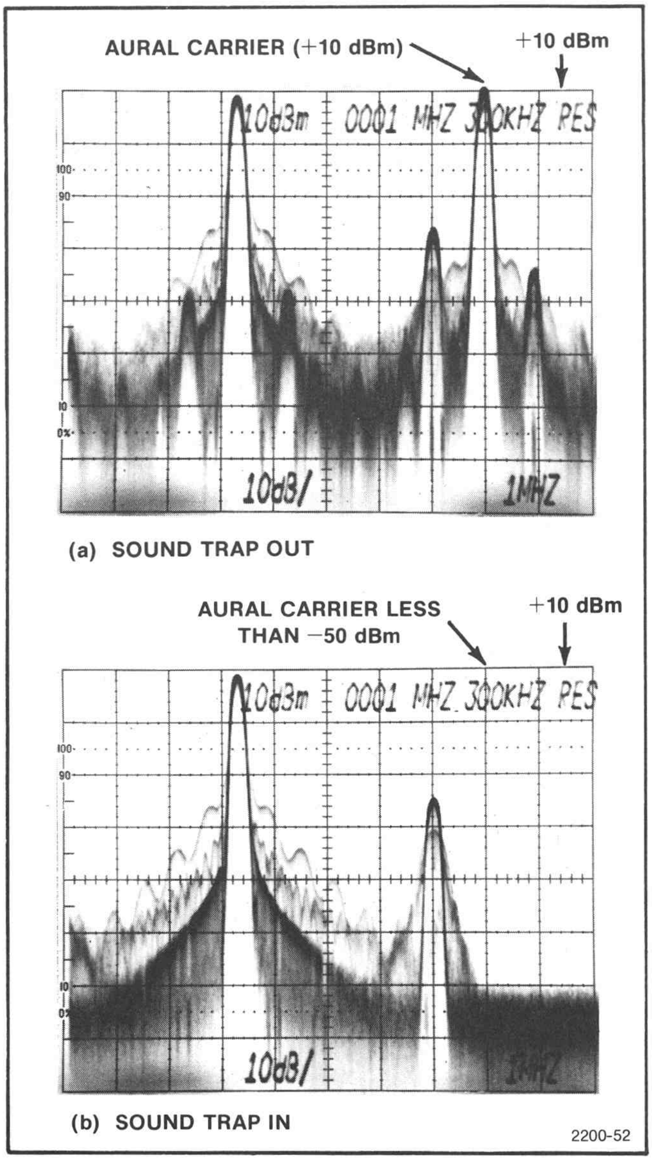


Fig. 4-19. Waveforms for Checking Aural Signal Rejection.

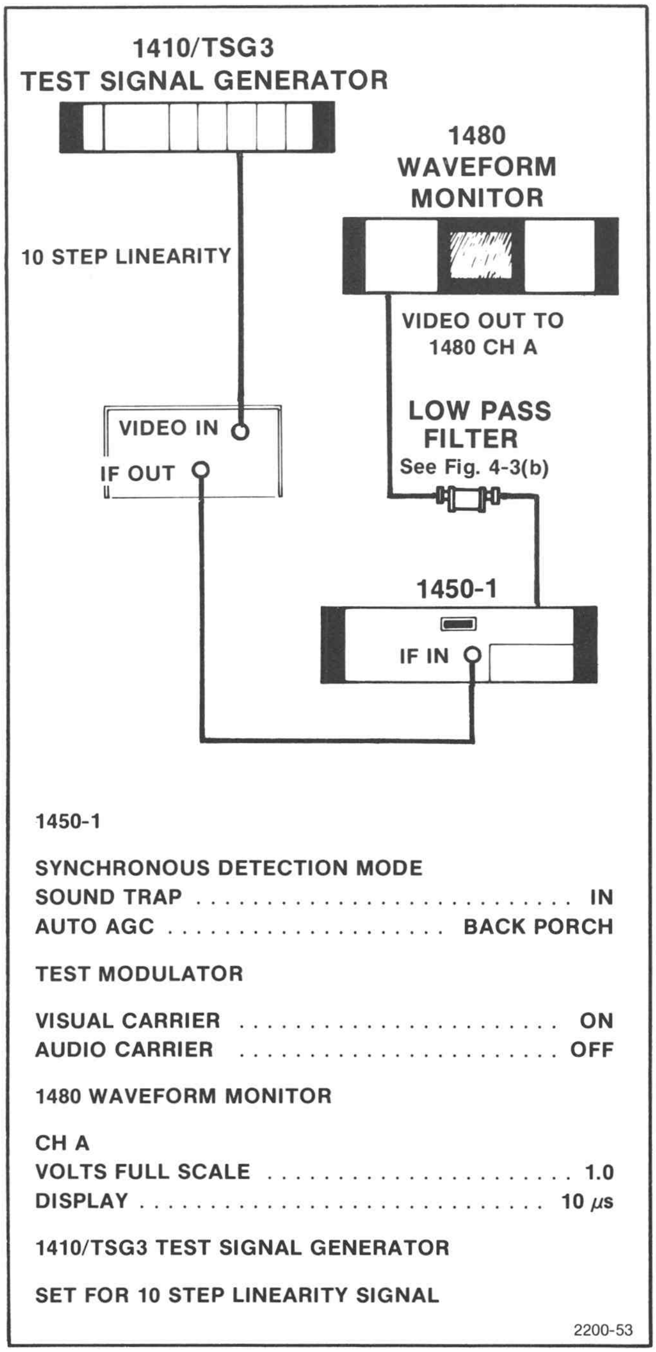


Fig. 4-20. Equipment Setup to Check Low Frequency Signal-to-Noise Ratio.

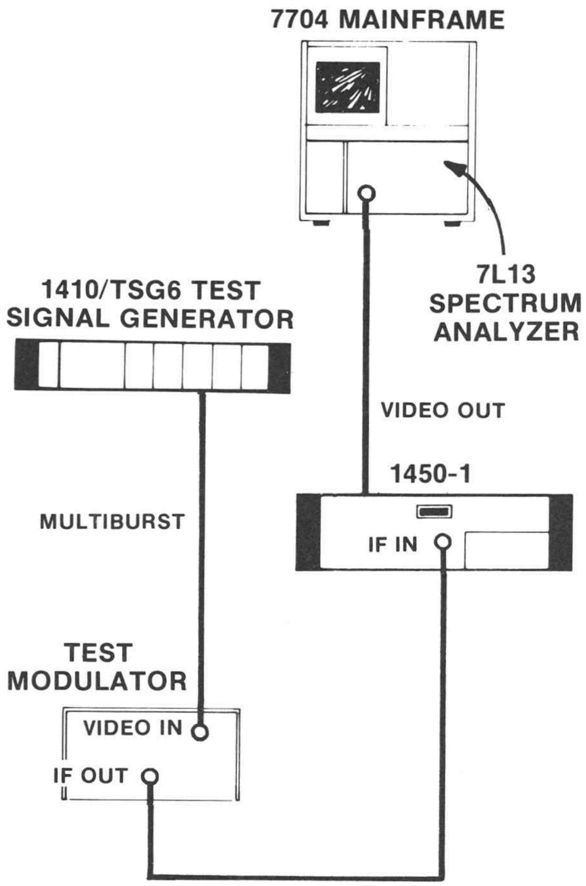
20. Check Video Signal-to-Noise Ratio (Mid-Frequency Coherent)

a. Connect the test equipment as shown in Fig. 4-21. Set the 7L13 Center Frequency at 0 MHz, Reference Level at 10 dBm, RF dB at 40, and (vertical) Mode at 10 dB/div.

b. Push in the ENV (DETECTION MODE), SOUND TRAP IN, INTERNAL ZERO CARRIER REF OFF, and BACK PORCH (AGC) buttons on the 1450-1 front panel.

c. Note the amplitude of the Multiburst signals on the 7L13, then disconnect the Multiburst from the test modulator.

d. Check that any signals are at least 50 dB down from the signals noted above. See Fig. 4-22.



TEST MODULATOR

VISUAL CARRIER . . . . ON

7L13 SPECTRUM ANALYZER

REFERENCE LEVEL . . . . −10 dBm
CENTER FREQUENCY . . . . .0000 MHz
FREQ SPAN . . . . 2 MHz
RESOLUTION . . . . 300 kHz
VIDEO FILTER . . . . 30 kHz

1450-1

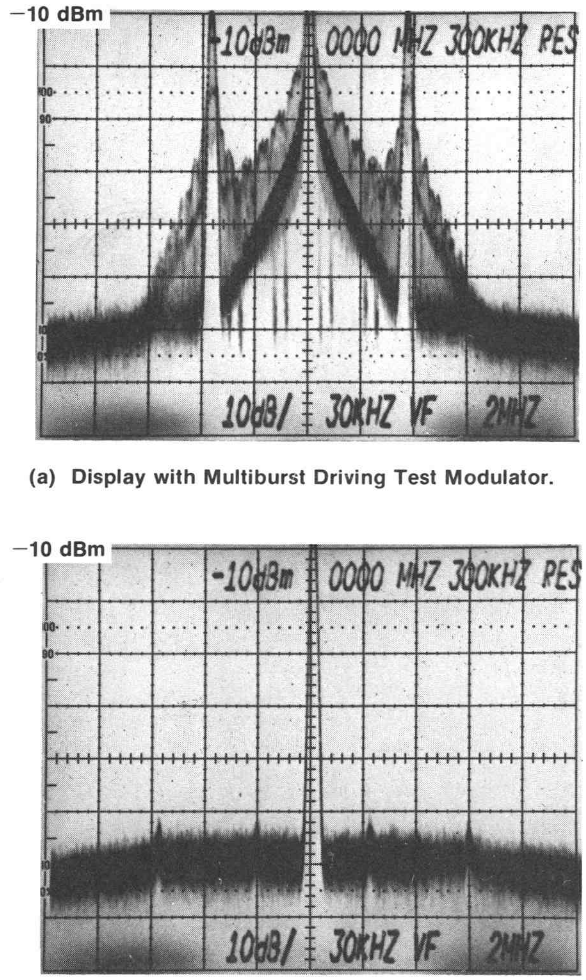
SYNCHRONOUS DETECTION MODE
SOUND TRAP . . . . IN
AUTO AGC . . . . BACK PORCH

1410/TSG6 TEST SIGNAL GENERATOR

TSG6 SET FOR COMPOSITE MULTIBURST, FULL AMPLITUDE, AND LOW FREQUENCY RANGE

2200-54

Fig. 4-21. Equipment Setup to Check Video Signal-to-Noise Ratio.



(a) Display with Multiburst Driving Test Modulator.

(b) Display with no Video Drive to the Test Modulator.

2200-55

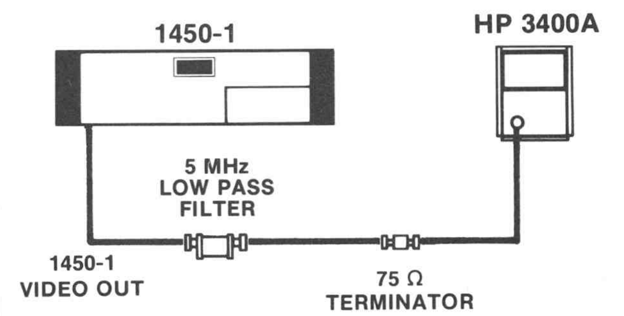
Fig. 4-22. Waveforms for Checking Video Signal-to-Noise Ratio.

21. Check Signal-to-Noise Ratio (White Noise)

a. Connect the test equipment as shown in Fig. 4-23. Make sure that P60 jumper on A58, Phase Lock Switch Board, is in the Test Only position; that is, pins 2 and 3 on P60 are jumpered.

b. Set the 1450-1 MANual GAIN control such that the RF SIGNAL INPUT LEVEL readout indicates −20 dBm. Read the noise level directly on the HP 3400A.

c. Check that the noise level indicated on the HP 3400A is −60 dB or less.



1450-1

SYNCHRONOUS DETECTION MODE .... CONT
SOUND TRAP .... IN
AGC .... MAN
AUDIO SOURCE .... INTR

P60 JUMPER ON A58 PHASE LOCK SWITCH BOARD MUST BE IN THE 'TEST ONLY' POSITION

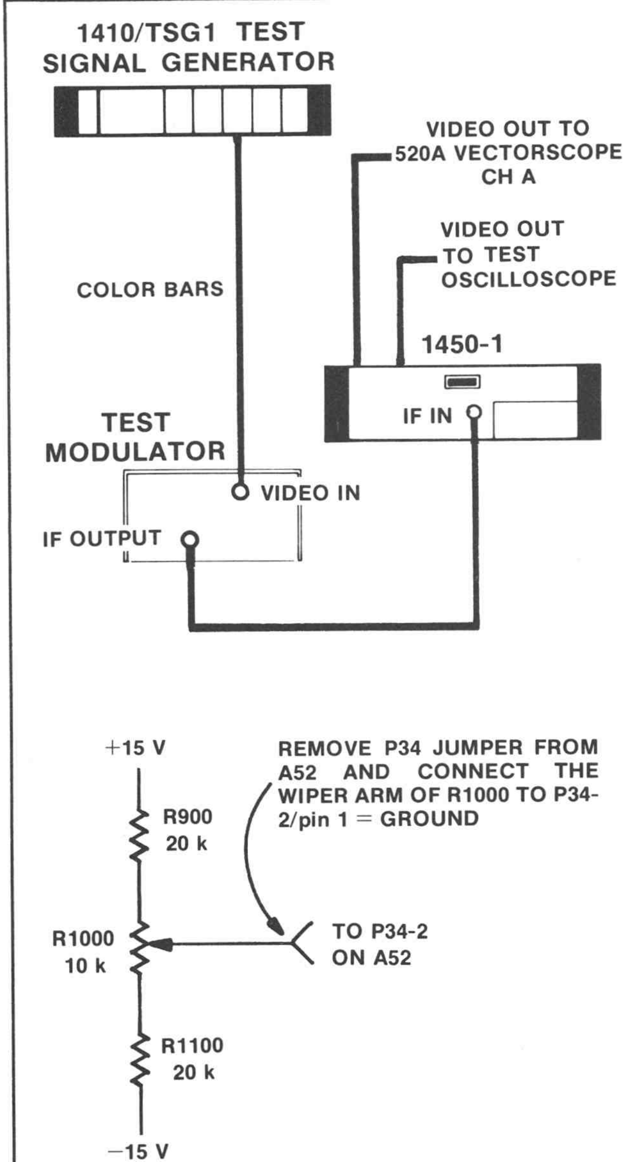
2200-56

Fig. 4-23. Equipment Setup to Check Signal-to-Noise Ratio (White Noise).

22. Check Quadrature Phase with respect to Video and Synchronous Detection Phase Angle

a. Connect the test equipment as shown in Fig. 4-24. Slowly vary R1000 until the test oscilloscope indicates maximum video. R1000 may have to be varied a few times in order to get maximum video output from the 1450-1. Maximum video output from the 1450-1 will be acquired when the voltage on the wiper arm of R1000 is close to 0 Vdc. Use the Ch A Gain controls to set the burst dot at the circle, and use the Ch A Phase control to align the burst dot with the 180° graticule line. Do not disturb the phase control after this.

b. Remove the cable connected to the 520A from the 1450-1 VIDEO OUTPUT, and connect it to the QUADRATURE OUTPUT.



1410/TSG1 TEST SIGNAL GENERATOR

SET FOR FULL FIELD COLOR BARS

520A VECTORSCOPE

CH A BUTTON .... IN
AØ BUTTON .... IN
FULL FIELD BUTTON .... IN

TEST MODULATOR

VISUAL CARRIER .... ON

1450-1

SYNCHRONOUS DETECTION MODE .... CONT
SOUND TRAP .... IN
AUTO AGC .... BACK PORCH

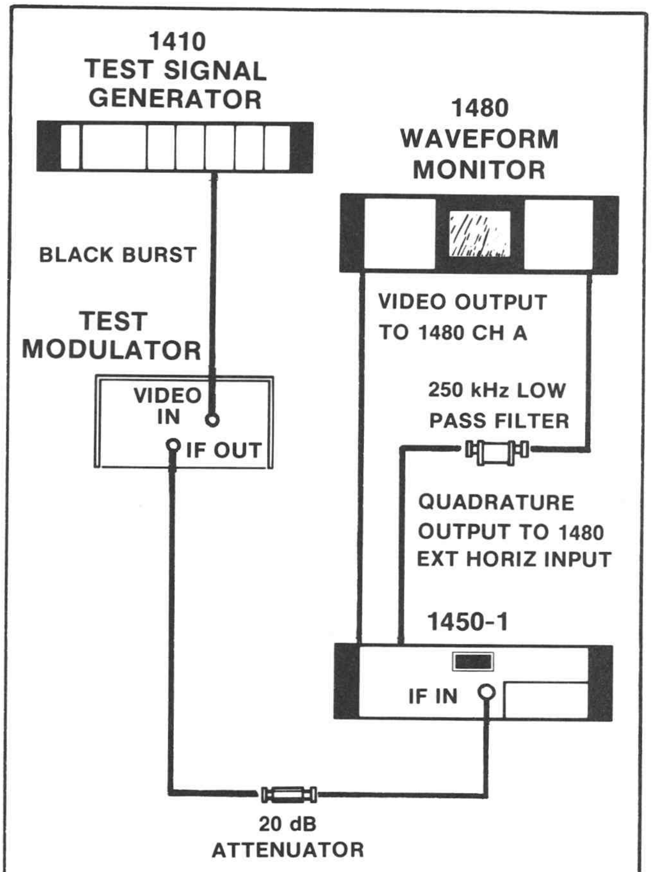
2200-57

Fig. 4-24. Equipment Setup to Measure Quadrature Phase with Respect to Video.

c. Check that the burst vector is 90° ±2° away from the VIDEO OUT burst vector.

d. Remove R1000 from P34-2 on A52, and replace the jumper to P34. Remove the cable from the 1450-1 QUADRATURE OUTPUT, and connect it to the VIDEO OUTPUT.

e. Check that the burst vector displayed on the 520A is within 3° of the previous setting.



1450-1

DETECTION MODE ...... SYNCHRONOUS (CONT)
SOUND TRAP .... IN
INTERNAL ZERO CARRIER REF .... ON
AGC .... BACK PORCH

TEST MODULATOR

VISUAL CARRIER .... ON

1480 WAVEFORM MONITOR

RESPONSE .... LOW PASS
INPUT .... A
VOLTS FULL SCALE 1.0
DISPLAY .... EXT

2200-58

Fig. 4-25. Equipment Setup to Measure Low Frequency Phase Noise.

23. Check Low-Frequency Phase Noise

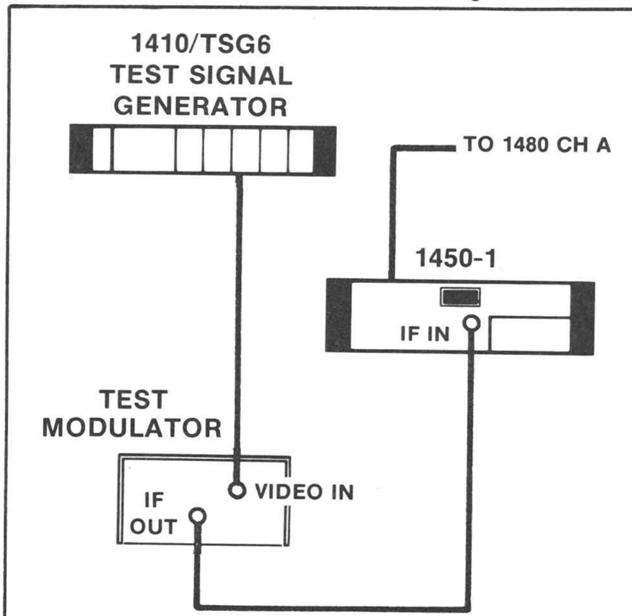
a. Refer to Fig. 4-25 for test equipment setup. Connect the 1410 Black Burst output to the test modulator Video In, and connect the test modulator IF output to the 1450-1 IF IN.

b. Connect the 1450-1 VIDEO OUT to the 1480 Ch A input, and connect the QUADRATURE OUT through a 250 kHz filter (015-0352-00) to the 1480 External Horiz In. Install a Phase Graticule in the 1480, set Mag to 0.1 (X50), and Response control to Low Pass.

c. Check that the phase display jitter is 1.25° P-P or less (0.25° is just over 1 division).

24. Check Zero Carrier Reference Gate

a. Drive the 1450-1 with Multiburst from a 1410/TSG6 Generator, using a test modulator. See Fig. 4-26. Monitor



TEST MODULATOR

VISUAL CARRIER .... ON

1410/TSG6 TEST SIGNAL GENERATOR

SET FOR MULTIBURST, FULL AMPLITUDE, AND LOW FREQUENCY RANGE

1450-1

SYNCHRONOUS DETECTION MODE . BACK PORCH
SOUND TRAP .... IN
AUTO AGC .... BACK PORCH

2200-59

Fig. 4-26. Equipment Setup to Check Zero Carrier Gating.

@

the 1450-1 VIDEO OUT with a 1480 set to view line 22, and Volts Full Scale setting of-1.0. Use the 1480 Volts Full Scale VAR control to set 160 IRE P-P of Multiburst on the 1480.

b. Move P73 jumper on A60 in the 1450-1 from line 20 to line 22.

c. Check for less than 2.5 IRE of multiburst at the top of the Zero Carrier Reference pulse when the Volts Full Scale control on the 1480 is set at 0.2.

d. Check that the Zero Carrier Reference Gate half-amplitude duration is 30 μs $\pm$3 μs.

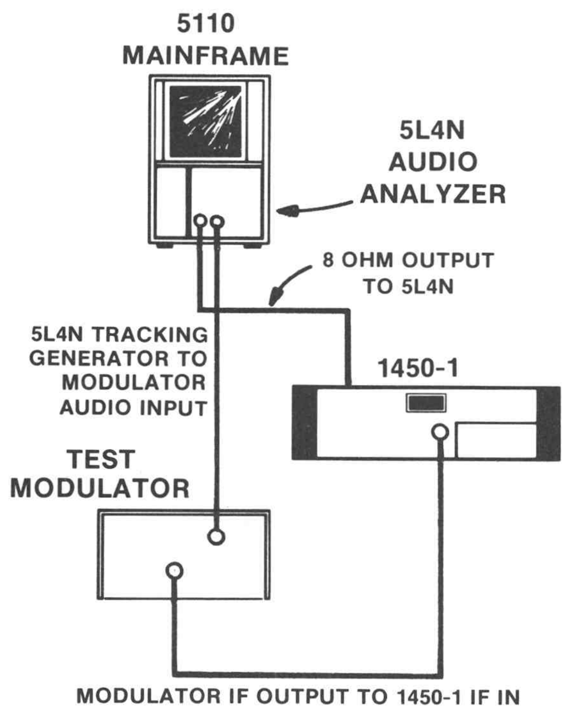
e. Set the 1480 front panel controls to display line 20 of the video signal. Reset P73 in the 1450-1 to line 20.

f. Check that the Zero Carrier Reference Gate is present in all four fields; that is, push in the 1480 Field buttons 1, 2, 3, and 4, and check that the Zero Carrier Reference Gate is present.

g. Check that the Zero Carrier Reference Gate extends from back porch to 120 IRE $\pm$0.5 IRE.

25. Check Audio Frequency Response Flat within 0.4 dB 30 Hz to 15 kHz

a. Connect the test equipment as shown in Fig. 4-27. Set the 5L4N Resolution control in detent (fully counterclockwise). Monitor the 8 Ω Speaker Output with the calibration fixture shown in Fig. 4-1. Use the 1450-1 AUDIO LEVEL control to set the audio output level at −30 dBm.



TEST MODULATOR

VISUAL CARRIER	ON
AURAL CARRIER	ON
AURAL CARRIER LEVEL	MIDRANGE

1450-1

MAN (AGC)	IN
SPLIT AUDIO SOURCE	IN
GAIN CONTROL	FULLY COUNTER-CLOCKWISE
AUDIO SOURCE	SPLIT (IN)
DE-EMPHASIS	OUT

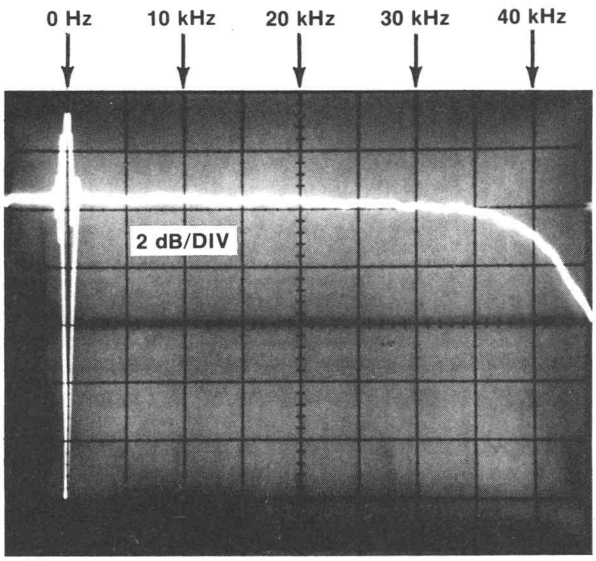
5L4N AUDIO ANALYZER

FREQUENCY	000
VERT MODE	2 dB/DIV
LOG REF	−20 dB
SPAN/DIV	5 kHz
RESOLUTION	AUTO
TRKG GEN	IN (ON CAL)
S/DIV	10 ms

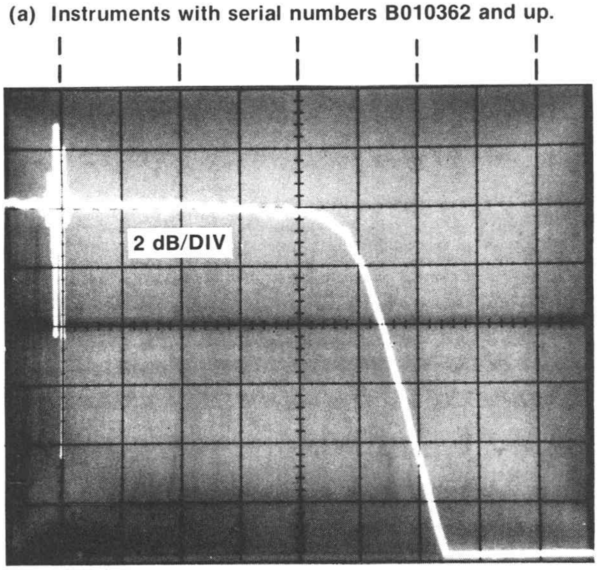
2200-60

Fig. 4-27. Equipment Setup to Check Audio Frequency Response.

b. Check that the frequency display on the 5L4N is flat within 0.4 dB from 20 Hz to at least 25 kHz in instruments with serial numbers B010362 and up, and 30 Hz to 15 kHz in instruments with serial numbers below B010362. See Fig. 4-28.



(a) Instruments with serial numbers B010362 and up.



(b) Instruments with serial numbers below B010362. 2200-61

Fig. 4-28. Audio Frequency Response.

26. Check De-Emphasis Audio Frequency Response (See Table 4-4; 75 μs Curve ±0.5 dB)

Table 4-4

DE-EMPHASIS AUDIO FREQUENCY RESPONSE

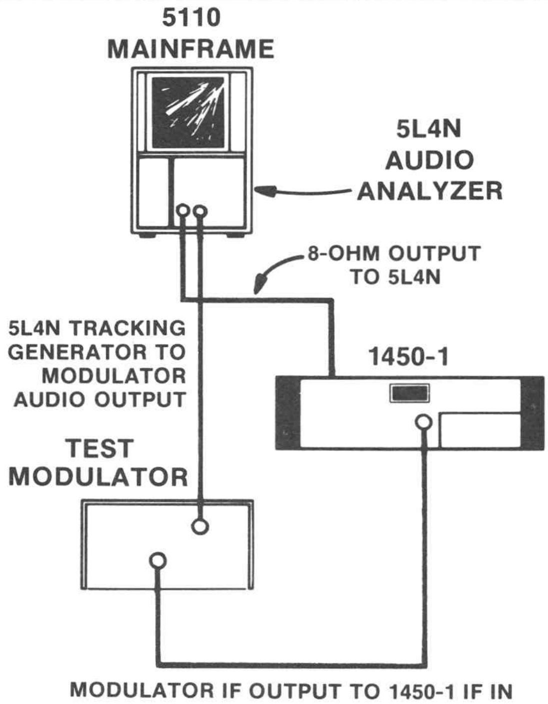
Frequency	Response
1.0 kHz	−0.87 dB
2.122 kHz	−3 dB
4.0 kHz	−6.58 dB
6.0 kHz	−9.54 dB
10.0 kHz	−13.66 dB
12.0 kHz	−15.18 dB
15.0 kHz	−17.07 dB
18.0 kHz	−18.63 dB
20.0 kHz	−19.53 dB

a. Connect the test equipment as shown in Fig. 4-29.

b. Check that the audio curve conforms to the table above ±0.5 dB.

27. Check Audio Harmonic Distortion (<0.2% at Full Output; 8 Ω Speaker Output Level, 5 Watts; Headphone AUDIO OUTPUT Level, 50 mH; and 600 Ω BALANCE LINE AUDIO OUTPUT Level, +10 dBm)

a. Connect the test equipment as shown in Fig. 4-30. Adjust the test modulator for 25 kHz deviation by adjusting Var Attenuator on the SG 502 for minimum 10.395 kHz at the center frequency. See Fig. 4-31.



TEST MODULATOR

VISUAL CARRIER	ON
AURAL CARRIER	ON
AURAL CARRIER LEVEL	MIDRANGE

1450-1

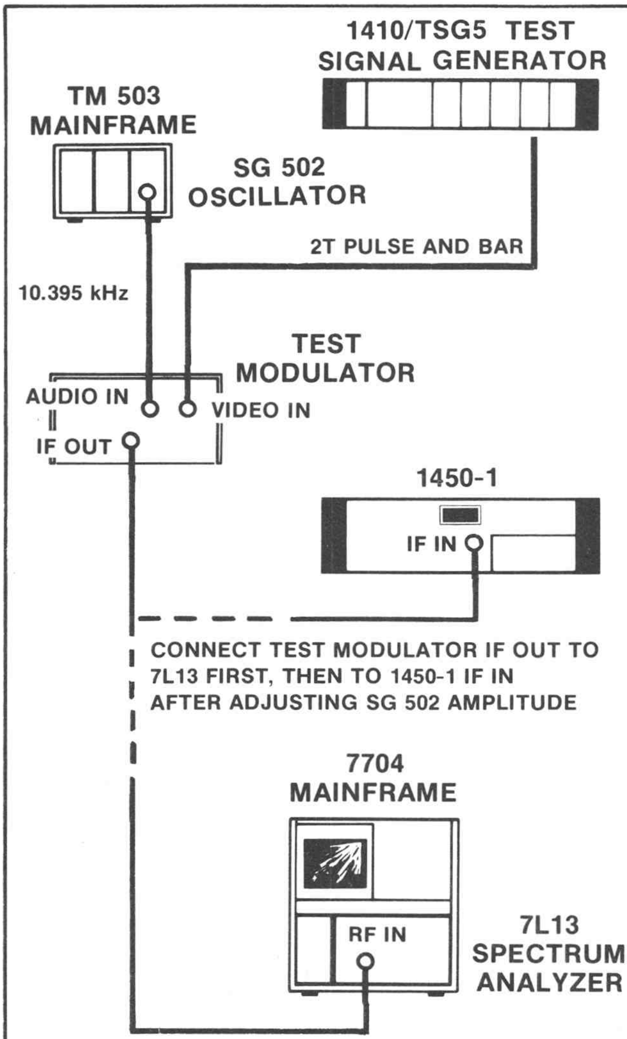
MAN (AGC)	IN
SPLIT AUDIO SOURCE	IN
GAIN CONTROL	FULLY COUNTER-CLOCKWISE
AUDIO SOURCE	SPLIT (IN)
DE-EMPHASIS	IN

5L4N AUDIO ANALYZER

FREQUENCY	000
VERT MODE	10 dB/DIV
LOG REF	−20 dB
SPAN/DIV	5 kHz
RESOLUTION	AUTO
TRKG GEN	IN (ON CAL)
S/DIV	10 ms

2200-62

Fig. 4-29. Equipment Setup to Check Audio De-Emphasis Frequency Response.



TEST MODULATOR

AURAL CARRIER	ON
VISUAL CARRIER	ON
AURAL CARRIER LEVEL	SET 10 dB BELOW VISUAL CARRIER LEVEL

7L13 SPECTRUM ANALYZER

CENTER FREQUENCY	(IF −4.5 MHz)
SPAN/DIV	10 kHz
RESOLUTION	3 kHz
TIME/DIV	20 ms

1450-1

SYNCHRONOUS DETECTION MODE	BACK PORCH
SOUND TRAP	IN
AGC	MANUAL GAIN
AUDIO SOURCE	SPLIT

1410/TSG5 TEST SIGNAL GENERATOR

SET FOR 2T PULSE AND BAR WITH 12.5T MODULATED PULSE

2200-63

Fig. 4-30. Equipment Setup to Check Audio Harmonic Distortion.

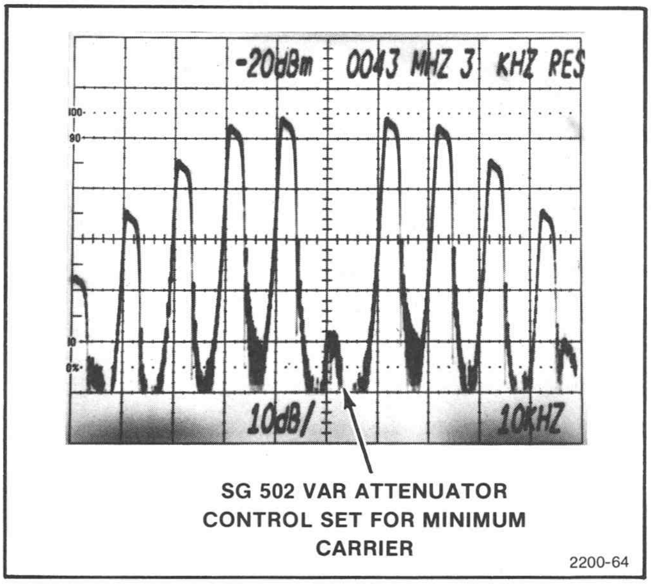


Fig. 4-31. Waveform for Setting 25 kHz Peak Deviation.

b. Connect the test modulator IF Out to the 1450-1 IF IN connector, and connect the 1450-1 INTERCARRIER OUT to the frequency counter. Set the test modulator Center Frequency such that the counter indicates 4.5 MHz.

c. Connect an 8 Ω/5 W load across the 1450-1 8 Ω output (J12) and connect a DM 502 across the 8 Ω load. Set the DM 502 to read ac volts, and set the 1450-1 AUDIO LEVEL control fully clockwise.

d. Check that the DM 502 indicates at least 6.32 Vrms across the 8 Ω load, then reset the 1450-1 AUDIO LEVEL control to indicate 6.32 V (5 W) on the DM 502. Do not change this AUDIO LEVEL setting for the duration of this step.

e. Connect an 8 Ω load across the headphone AUDIO OUTPUT terminals, and connect the DM 502 across the 8 Ω load.

f. Check that the DM 502 readout indicates an output level of at least 0.632 V (50 mW).

g. Monitor the 600 Ω BALANCED LINE AUDIO OUTPUT (J13) with the DM 502 using the test fixture shown in Fig. 4-32. Remove the 30 dB pad in the test fixture. Push in SPLIT and MAN (AGC) buttons on the 1450-1 front panel.

h. Check that the 600 Ω BALANCE LINE output level is 2.45 V (1 W into 600 Ω).

i. Monitor the 8 Ω SPEAKER Output (J12) at the 1450-1 rear panel with the 5L4N Audio Analyzer, using the 8 Ω-to-600 Ω pad shown in Fig. 4-33. Switch in the 30 dB pad in the 8 Ω-to-600 Ω test fixture. Set the 5L4N as follows:

Frequency	25 kHz
Span/Div (Hz)	5 K
s/div	10 ms
Log Ref	−20
Mode	10 dB/div
Ext Termination	600 Ω
Auto Trig	In

j. Check that the 2nd and 3rd harmonics on the 5L4N display are at least 54 dB down at each of the following settings of the SG 502 output: 100 Hz, 1 kHz, and 10 kHz.

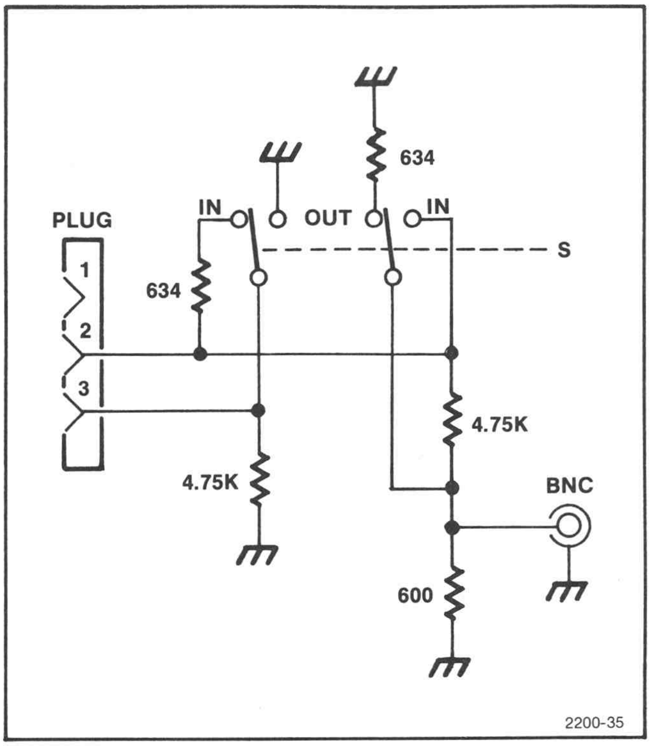


Fig. 4-32. 600 Ω Audio Output Calibration Fixture with Switchable 30 dB Attenuator.

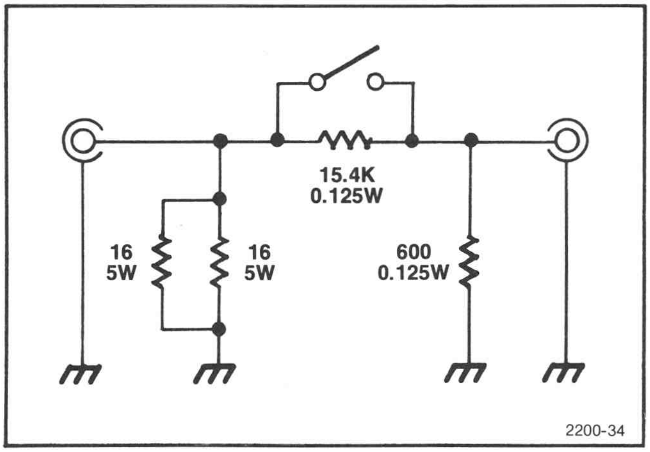


Fig. 4-33. 8 Ω to 600 Ω Impedance Matching Calibration Fixture with Switchable 30 dB Attenuator.

k. Monitor J13 (600 Ω BALANCED LINE OUTPUT) with the 5L4N Audio Analyzer using the 600 Ω/30 dB pad shown in Fig. 4-32. Switch in the 30 dB pad in the 600 Ω/30 dB pad test fixture.

l. Check that the 2nd and 3rd harmonics on the audio analyzer display are at least 54 dB down at each of the following settings of the SG 502: 100 Hz, 1 kHz, and 10 kHz.

28. Check Audio Signal-to-Noise Ratio Split, Aural Only, and External 75 dB Intercarrier 55 dB

a. Connect the test equipment as shown in Fig. 4-34. Adjust the test modulator for 25 kHz deviation by adjusting Var Attenuator on the SG 502 until the audio carrier signal at the middle of the 7L13 display disappears. See Fig. 4-35.

b. Connect the test modulator IF Out to the 1450-1 IF IN connector, and connect the 1450-1 INTERCARRIER OUT to the frequency counter. Adjust the test modulator Center Frequency such that the counter indicates 4.5 MHz.

c. Connect the 1450-1 8 Ω SPEAKER output to an HP 3400A RMS Volt Meter using the 8 Ω-to-600 Ω pad shown in Fig. 4-36. Push in the SOUND TRAP IN, BACK PORCH (AGC), INTR (AUDIO SOURCE), and DE-EMPHASIS OUT buttons on the 1450-1 front panel. Note the level readout on the 1450-1. Push in the 1450-1 MAN (GAIN) button, and set the (MAN) GAIN control for the same readout as when the 1450-1 is in BACK PORCH (AGC). Set the AUDIO LEVEL control for a 10 dB audio level indication on the HP 3400A.

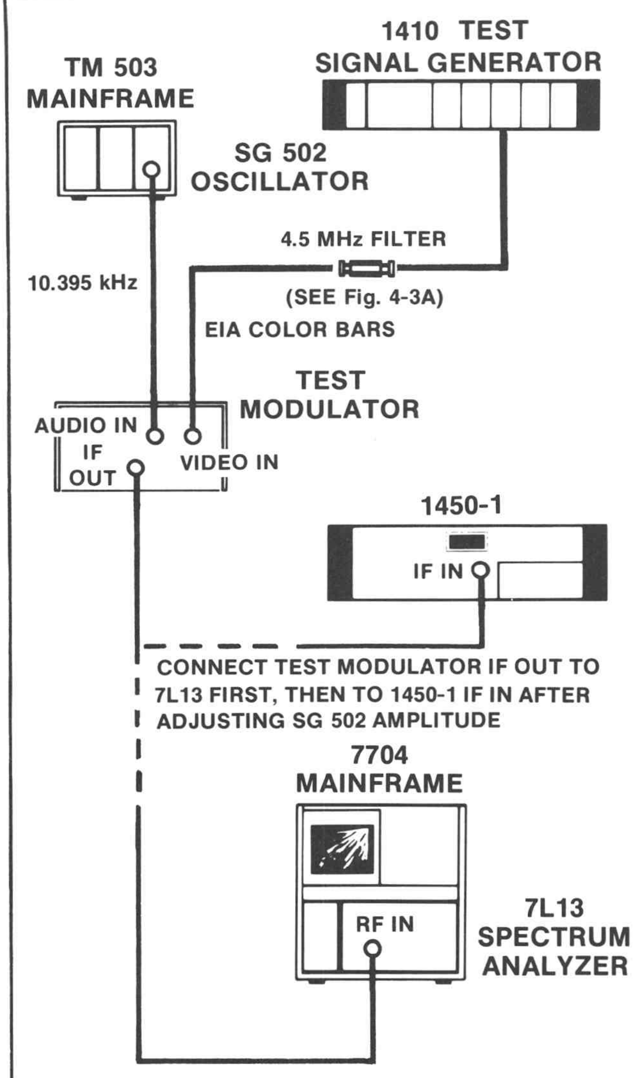
d. Set the test modulator Audio Off.

e. Check that the HP 3400A indicates at least −45 dB noise level (−55 dB down from the previous reading).

f. Push in the SPLIT (AUDIO SOURCE) button on the 1450-1 front panel.

g. Check that the HP 3400A indicates at least −65 dB noise level (−75 dB down from the original reading).

h. Set the test modulator visual carrier Off. Push in the AURAL ONLY (AUDIO SOURCE) button on the 1450-1 front panel.



TEST MODULATOR

AURAL CARRIER SOURCE	ON
VISUAL CARRIER	ON

7L13 SPECTRUM ANALYZER

CENTER FREQUENCY	(IF −4.5 MHz)
SPAN/DIV	10 kHz
RESOLUTION	3 kHz
TIME/DIV	20 ms

1450-1

SYNCHRONOUS DETECTION MODE	BACK PORCH
SOUND TRAP	IN
AGC	BACK PORCH
AUDIO SOURCE	INTR
DE-EMPHASIS	OUT

2200-65

Fig. 4-34. Equipment Setup to Check Audio Signal-to-Noise Ratio.

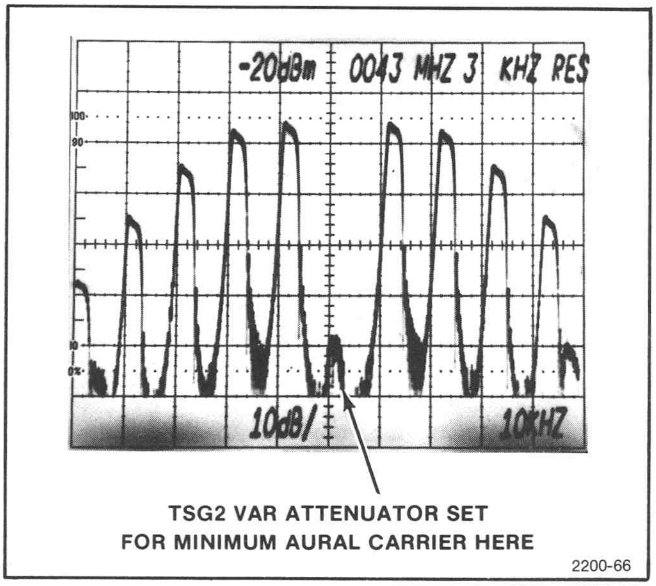


Fig. 4-35. Waveform for Setting 25 kHz Peak Deviation.

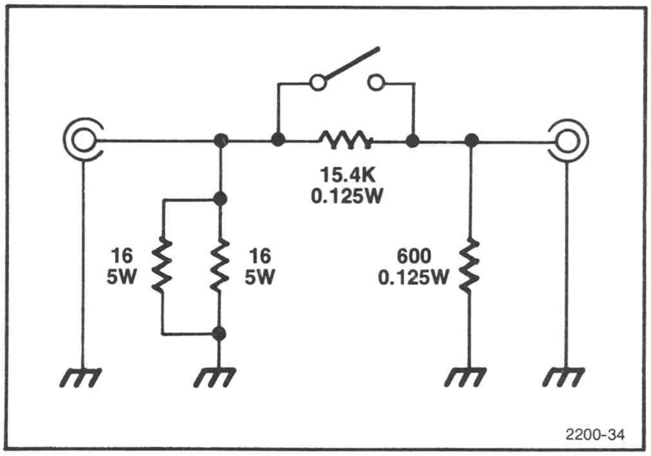


Fig. 4-36. 8 Ω to 600 Ω Impedance Matching Calibration Fixture with Switchable 30 dB Attenuator.

i. Check that the HP 3400A indicates at least −65 dB noise level (−75 dB down from the original reading).

j. Connect an HP 8640B CW output to the 1450-1 AURAL INTERCARRIER INput, and set the HP 8640B for an output level of −30 dBm at 4.5 MHz. Push in the 1450-1 EXT (AUDIO SOURCE) button.

k. Check that the HP 3400A indicates at least −65 dB noise level (−75 dB down from the original reading).

29. Check Aural and Visual Alarms

a. Drive the 1450-1 with a test modulator. Add attenuation to the aural carrier until the aural alarm LED lights.

b. Check that the aural carrier is at least 15 dB down from the visual carrier.

c. Increase the aural carrier (remove attenuation from the aural carrier) to the previous level, and add attenuation to the visual carrier until the visual alarm LED lights.

d. Check that the visual carrier is less than −69 dBm.

30. Check DEVIATION OUT

a. Connect the test equipment as shown in Fig. 4-34. Adjust the test modulator for 25 kHz deviation by adjusting Var attenuator on the SG 502 for minimum 10.395 kHz at the center frequency. See Fig. 4-35.

b. Connect the test modulator IF Out to the 1450-1 IF IN connector, and connect the 1450-1 INTERCARRIER OUT to the frequency counter. Set the test modulator Center Frequency such that the counter indicates 4.5 MHz.

c. Connect the DEVIATION OUTput on the 1450-1 to the DM 502, and set the DM 502 at 2 Vac.

d. Check that the DEVIATION OUTput level is 0.884 Vrms.

31. Check Aural Intercarrier

a. Drive the 1450-1 with a test modulator, and drive the 1450-1 AURAL INTERCARRIER IN with a −30 dBm signal at 4.5 MHz. Set the test modulator aural carrier and visual carrier on. Push in the 1450-1 INTR button, and monitor the AURAL INTERCARRIER OUT with a spectrum analyzer.

b. Check for an intercarrier signal at 4.5 MHz. Its level will depend on the setting of the test modulator aural carrier level.

c. Push in the 1450-1 EXT button.

d. Check for an intercarrier signal (4.5 MHz) at 0 dBm. The intercarrier circuit has a gain of approximately 30 dB, and should not be driven with a signal over −20 dBm.

32. Check Return Loss

a. Parts b through h are performed using a high-frequency return-loss bridge such as a Wiltron Model 62NF50; and parts i through u are performed using a video return-loss bridge such as Tektronix Part No. 015-0149-00.

b. Connect the test equipment as shown in Fig. 4-37. Establish a reference level on the 7L13.

c. Connect point "A" to the 1450-1 IF IN connector.

d. Check that return loss is at least 18 dB; that is, the trace is down at least 18 dB from the reference established in part a. Check return loss as follows:

Option 1, 31.50 MHz to 38.50 MHz; Option 2, 32.40 MHz to 39.40 MHz; Option 3, 41.25 MHz to 47.25 MHz.

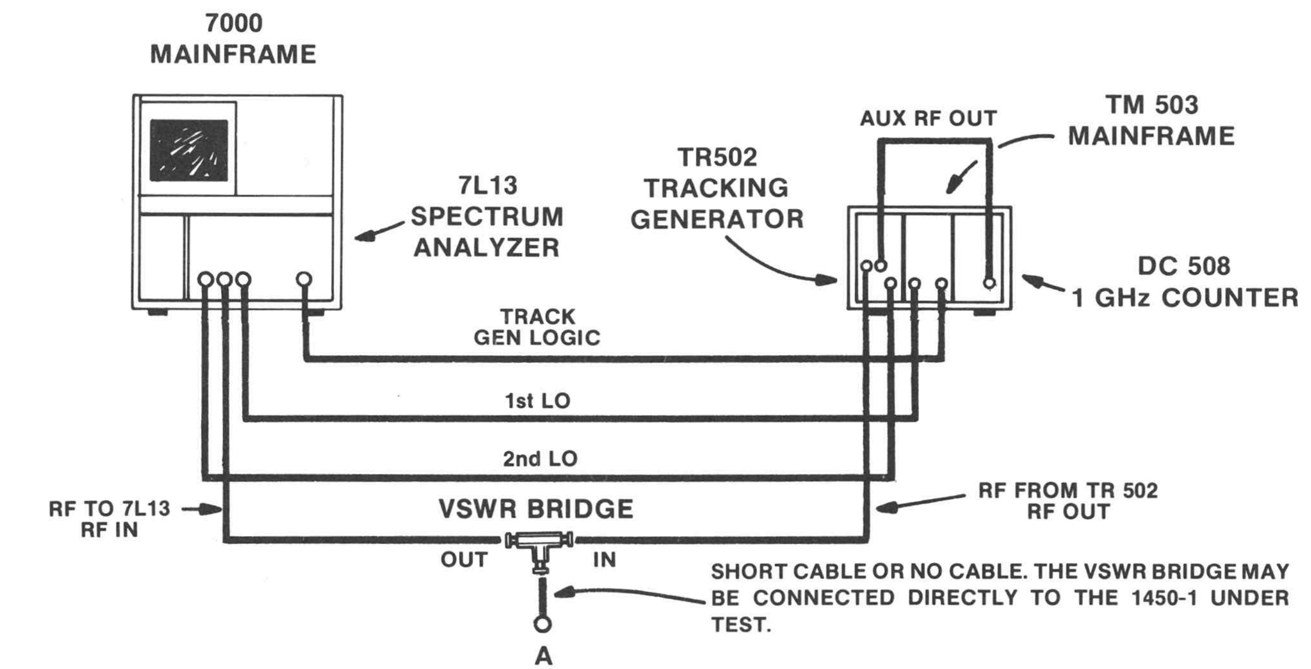
e. Disconnect the VSWR Bridge from the 1450-1 IF IN connector, and connect it to the 1450-1 INTERCARRIER IN connector. Set the 7L13 Center Frequency at 4.5 MHz.

f. Check that return loss is 20 dB or better.

g. Disconnect the VSWR Bridge from the 1450-1 INTERCARRIER IN connector, and connect it to the INTERCARRIER OUT connector.

h. Check that return loss is 20 dB or better. Disconnect the VSWR Bridge from the 1450-1.

i. Use the video return-loss bridge (Tektronix Part No. 015-0149-00) to check return loss from part i through part u. Connect the Return Loss Bridge to the 7A13 Differential Comparator plug-in in the test oscilloscope. Dc-couple the (+) and (−) inputs on the 7A13 plug-in.



7L13 SPECTRUM ANALYZER

MODE	10 dB/DIV
REFERENCE LEVEL	−30 dBm
REF dB	0
TRIGGERING	Source = INT Mode = NORM
TIME/DIV	10 ms
FREQ SPAN/DIV	5 MHz
RESOLUTION	3 MHz
CENTER FREQUENCY	IF FREQUENCY

TR 502 TRACKING GENERATOR

OUTPUT LEVEL	−30 dBm
VAR dB	0

2200-67

Fig. 4-37. Return Loss Measurement Setup.

j. Connect the SG 503 Sine Wave Generator through a 50 Ω-to-75 Ω Minimum Loss Attenuator to the Return Loss Bridge input.

k. Set the SG 503 frequency to 5 MHz, and the test oscilloscope Volts/Div to 0.1 V.

l. Remove the 75 Ω termination from the Return Loss Bridge Unknown Arm, and adjust the SG 503 Output for a 500 mV sine-wave display as viewed on the test oscilloscope.

m. Replace the 75 Ω termination to the Return Loss Bridge Unknown Arm.

n. Set the test oscilloscope Volts/Div at 10 mV, and adjust the Return Loss Bridge Bal control for minimum display on the test oscilloscope.

o. Remove the 75 Ω termination from the Return Loss Bridge Unknown Arm, and connect the Unknown Arm to the 1450-1 QUADRATURE OUTPUT connector.

p. Check that the test oscilloscope display (return loss) is 10 mV or less (34 dB or better).

q. Disconnect the Return Loss Bridge Unknown Arm from the QUADRATURE OUTPUT and connect it to one of the VIDEO OUTPUTS.

r. Check that the test oscilloscope display (return loss) is 10 mV or less (34 dB or better).

s. Disconnect the Return Loss Bridge Unknown Arm from the one VIDEO OUTPUT and connect it to the other VIDEO OUTPUT.

t. Check that the test oscilloscope display (return loss) is 10 mV or less (34 dB or better).

u. Disconnect the Return Loss Bridge from the 1450-1 and the test oscilloscope.

33. Check SYSTEM RF Attenuator Range (±0.25 dB)

a. Set the HP 8640B output frequency at 50 MHz, and set the output level at 0 dBm using the spectrum analyzer. Connect the HP 8640B RF output to the 1450-1 rear-panel RF IN connector, and connect the 1450-1 RF OUTput to an HP 435A power meter. Set the power meter controls to measure a 0 dBm power level.

b. Push in the 10 dB button on the 1450-1 front panel.

c. Check that the power meter reading decreases by 10 dB ±0.25 dB.

d. Release the 10 dB button on the 1450-1, and push in the 20 dB button.

e. Check that the power meter reading decreases by 20 dB ±0.25 dB from the original reading (original reading = both attenuator buttons out).

f. Push in both the 10 dB and 20 dB buttons on the 1450-1 front panel.

g. Check that the power meter reading decreases by 30 dB ±0.25 dB from the original reading (original reading = both attenuator buttons out).

ADJUSTMENT PROCEDURE

SHORT-FORM ADJUSTMENT PROCEDURE

ADJUSTMENT PROCEDURE

1. Adjust Power Supply (R66)

NOTE

Refer to the Power Supply board illustration opposite Diagram 14 in the Diagrams section for interconnection plug locations.

a. Monitor P80-1 on A70 Power Supply board with the DM 502 Digital Multimeter.

b. Adjust R66 (−15 V Adjust) on A70 Power Supply board for −15 V ±0.5% as indicated on the DM 502.

c. Connect the DM 502 to P30-1 and check that the +5 V power supply is within ±1%.

d. Connect the DM 502 to P10-1 and check that the +15 V power supply is within ±1%.

NOTE

The following adjustments involve circuit boards that have hard-to-reach adjustable inductors. These circuit boards should be installed in the 1450-1 using the Extender board for easy access to the adjustments.

An Extender board (670-5034-00) is included in the Standard Accessories Kit. This board allows the shield-mounted boards to be extended out of the shield for calibration.

Extra pins are added to the interface boards where necessary to provide grounds for signal connections. To look at the output of a stage, remove the board it drives, and connect the BNC-to-Square Pin Adapter cable to the input pins of the board just removed. Also, in order to drive the input of a stage with an external signal, remove the board driving that stage. Drive the output pins of the board just removed with the external signal using the BNC-to-Square Pin Adapter cable provided.

Each shield-mounted board has a tooling hole for extracting the board from the shield. A small screwdriver, or the tip of a pair of needle-nose pliers inserted in the tooling hole, may be used as a lever to pull the board out.

The oscillators will have to be slightly misadjusted to compensate for operation on the Extender board. The amount of misadjustment can be determined by comparing the frequency of the oscillator when the circuit board involved is in its extrusion compartment against the frequency of the oscillator when the board is mounted on an extender board.

When a spectrum analyzer is used to monitor square pins on an interface board using a BNC-to-Square Pin Adapter cable, caution must be taken that the square pin end of the adapter cable is not connected across power supply pins. Dc voltages applied to the spectrum analyzer will destroy the mixer in the spectrum analyzer. It is suggested that a dc-blocking capacitor (Tektronix Part No. 015-0221-00) be used in line with the signal being monitored when there is some doubt about the dc level of any point in the 1450-1 that has to be monitored with a spectrum analyzer.

2. Adjust AGC Low Pass Filter (L28 and L38 on A60 AGC Control board)

a. It will be necessary to remove A61 Readout Driver board from the 1450-1 in order to access the adjustments on the AGC Control board. Refer to Fig. 8-8 for the locations of the harmonica connectors and screws on the Readout Driver board. To remove the Readout board, follow these steps:

(1) Turn the 1450-1 power off. Remove all harmonica connectors from the Readout Driver board.

(2) Remove the two phillips head screws from the rear corners of the Readout Driver board.

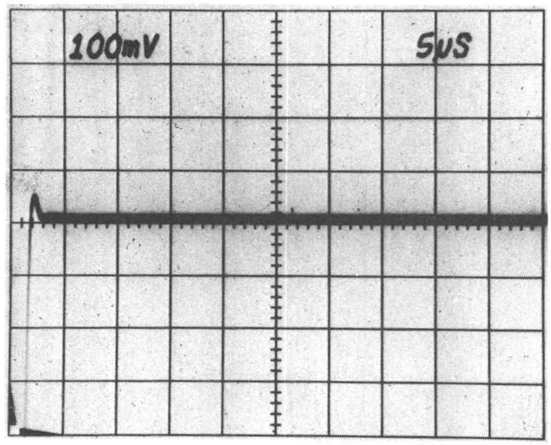
(3) Gently slide the Readout Driver board from the Readout board by pulling the Readout Driver board towards the rear of the 1450-1.

b. Remove P29 from A60 AGC Control board, and use a BNC-to-Square Pin Adapter cable to connect the output of the TSG3/1410 video signal generator to P29 pin 1 using the signal (center) conductor only. Set the TSG3/1410 front-panel controls for a 100 IRE Flat Field output.

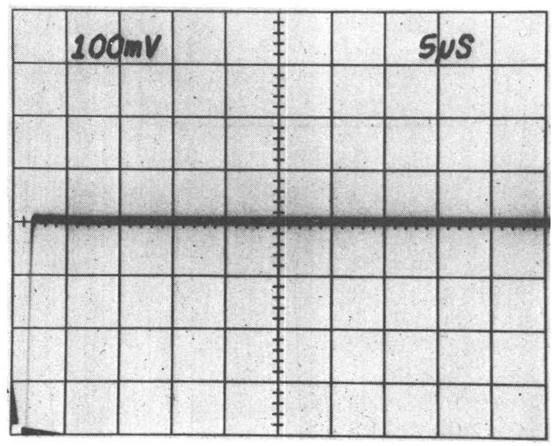
c. Turn the 1450-1 on, and connect a 10X probe from the test oscilloscope vertical plug-in to TP27 on A60 AGC Control board.

d. Set the test oscilloscope Volts/Div at 10 mV and the Time/Div at 10 μs. Externally trigger the test oscilloscope with Composite Sync from the 1410. Use the Vertical Position control on the test oscilloscope to position the leading edge of the display within the viewing area.

e. Adjust L28 and L38 for the best transient response at TP27. Refer to Fig. 8-8 for adjustment locations, and see Fig. 4-38 for typical waveforms.



(a) Waveform at TP27 before adjustment of L28 and L38 on A60 AGC Control board.



(b) Waveform at TP27 after adjustment of L28 and L38 on A60 AGC Control board.

2200-68

Fig. 4-38. Adjustment of L28 and L38.

3. Adjust AGC Current (R59, R58, R57, R55, and R33 on A60 AGC Control board)

a. Set the FG 502 Multiplier at 1 and the Frequency dial at 5.

b. Select a triangle waveform output with the Function control on the FG 502 front panel.

c. Set the FG 502 Amplitude for 10 V P-P output amplitude.

d. Pull the FG 502 Offset control and set it such that the FG 502 Output varies between 0 Vdc and +10 Vdc.

e. Remove P28 from A60 AGC Control board and connect the FG 502 Output to P28-2. See Fig. 8-8 for adjustment and harmonica connector locations. By slightly bending pin 2 on P28, P28 can be replaced in the 1450-1 while the output of the FG 502 is still connected to pin 2 of P28.

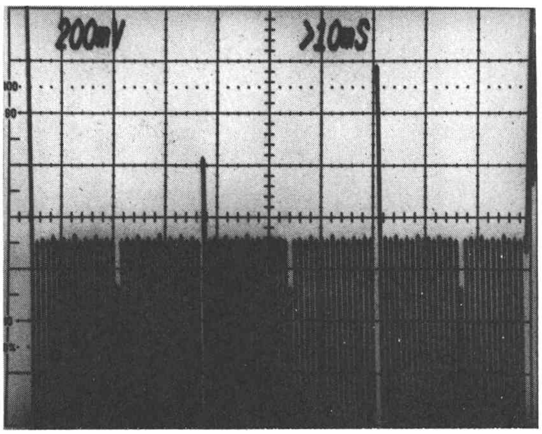
f. Monitor TP45 on A60 with the test oscilloscope through a 10X probe. Use a 7A13 comparator plug-in in the test oscilloscope vertical.

g. Set the test oscilloscope Volts/Div at 10 mV and Time/Div at 10 ms. Externally trigger the test oscilloscope with the FG 502 Trig Out.

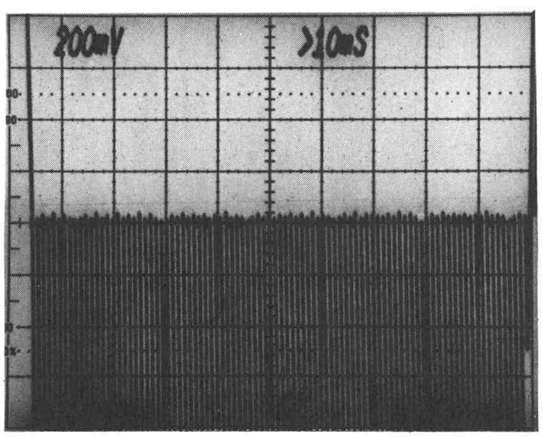
h. Push in the MAN button on the 1450-1 front panel and turn the AGC SPEED control fully counterclockwise.

i. Adjust R59, R58, R57, and R55 in that order for equal amplitude of the LSBs (smaller amplitude ramps) displayed on the test oscilloscope. See Fig. 4-39 for typical displays.

j. Reset the test oscilloscope time base to 20 ms/div. The display on the test oscilloscope should be about the same as in Fig. 4-40a.



(a) Waveform at TP45 before adjustment of R59, R58, R57, and R55 on A60 AGC Control board.



(b) Waveform at TP45 after adjustment of R59, R58, R57, & R55 on A60 AGC Control board.

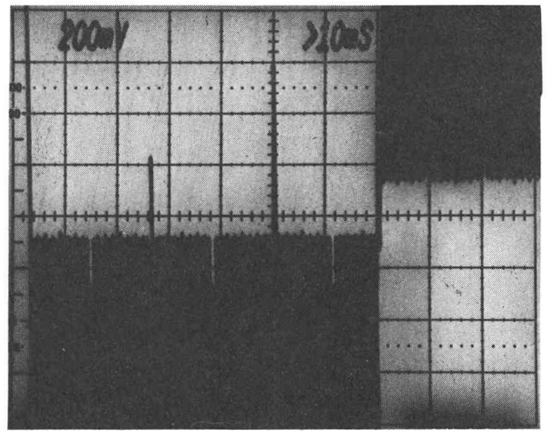
2200-69

Fig. 4-39. Adjustment of R59, R58, R57, R55, and R33 on the AGC Control board.

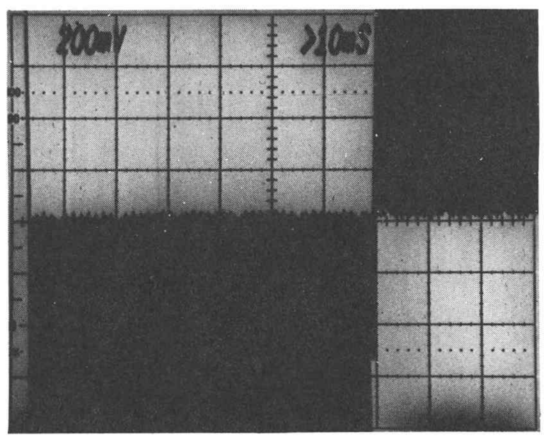
k. Adjust R33 such that the tops of the ramps just barely touch. See Fig. 4-40b for typical displays.

l. Remove the FG 502 Output from P28-2 and replace the wire to P28-2.

m. Replace the Readout Driver board in the 1450-1 by reversing the removal procedure in part a of step 2.



(a) R33 Misadjusted.



(b) R33 Adjusted.

2200-70

Fig. 4-40. Comparative Waveforms for Adjustment of R33 on A60.

4. Adjust Reference Oscillator (L03 and L41 on A51 Reference Osc board)

a. Remove U56 from A50 Ref Control board, and monitor TP91 on A50 Ref Control board (collector of Q80) with the test oscilloscope. The signal will be a 6.5 V square wave.

b. Adjust L03 on A51 for zero beat at TP91, typically less than 1 cycle per 0.2 ms.

c. Remove the cable from P89 on A58 Phase Lock Switch board, and monitor P89 with the 7L13. Push in the SPLIT (AUDIO SOURCE) button on the 1450-1 front panel. Set the 7L13 Center Frequency at 24 MHz.

d. Adjust L41 on A51 for maximum power at P89, typically 0 dBm or slightly greater.

e. Repeat parts a and b above. Final adjustment of L03 on A51 should result in a frequency of less than 5 kHz after A51 is replaced in the 1450-1.

f. Replace the cable to P89 on A58, and replace U56 on A50.

5. Adjust Temperature Tracking Balance (R60 and R70 on A50 Ref Control board)

NOTE

Adjustment of R70 should be made at room temperature. R60, the temperature tracking GAIN adjustment will be made later at an elevated temperature.

a. Connect a DM 502 multimeter between pin 7 on U56 and pin 11 on A50. Set the DM 502 to read volts.

b. Adjust R70 (labeled BAL) for 0 V between pin 7 on U56 and pin 11 on A50.

6. Adjust Converter LO (L03, L41, and C84 on A57 Converter Oscillator board)

a. Remove A53, Converter Phase Lock board, from the 1450-1 on A59, Phase Lock Interface board. Short pins 5 and 6 (marked CONVTR: OUT, GROUND) in A53 location together. Monitor TP70 on A56 Converter Control board with the test oscilloscope. Set the oscilloscope Time/Div at 20 μs, and coupling to ac. The signal will be a sine wave of approximately 1 V P-P amplitude.

b. Adjust L03 on A57 for zero beat at TP70 on A56.

c. Remove the cable at P97 at rear of A59 Phase Lock Interface board, and connect P97 to the 7L13 RF IN using a BNC-to-Peltola Adapter cable. Set the 7L13 Freq Span/Div at 5 MHz; Resolution at 300 kHz; Time/Div at 10 ms; Reference Level at +20 dBm; Mode at 2 dB/div; and Center Frequency according to the following table:

Option	Vision IF	7L13 Center Frequency
1	37 MHz	61.25 MHz
2	38.9 MHz	63.15 MHz
3	45.75 MHz	70 MHz

d. Adjust L41 and C84 on A57 for maximum local oscillator amplitude at P97 on A59 as viewed on the 7L13, typically about +18 dBm (5 V P-P).

e. Replace the cable to P97 on A59.

f. Repeat parts a and b above, and replace A53 in the 1450-1. Final adjustment of L03 on A57 should result in a difference frequency of less than 10 kHz after A57 is installed in the extrusion (A57 location).

g. Remove the jumper from A53 location (pins 5 and 6), and replace A53 in the 1450-1.

7. Adjust IF Atten/Amp Bias (R46 on A21)

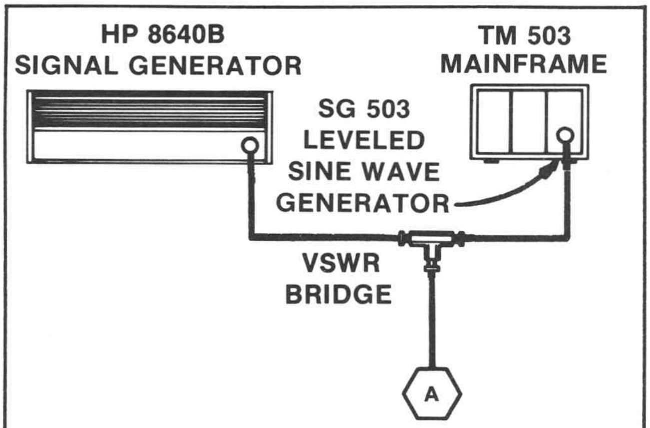
a. Connect the test equipment as shown in Fig. 4-41. Connect point "A" in Fig. 4-41 to the 7L13 RF In. Set the HP 8640B RF Output level and SG 503 Output level at −20 dBm as viewed on the 7L13.

b. Now connect point "A" in Fig. 4-41 to the output pins (pin 11/p12 = ground) in A20 location on the 1450-1, and remove A22 from the 1450-1 IF chain. Monitor the input pins in A22 location with the 7L13 using the BNC-to-Square Pin Adapter cable. Push in (AGC) MAN button. Set the 1450-1 (MAN) GAIN control fully counterclockwise, and set the 7L13 Center Frequency as in Fig. 4-41.

c. Adjust R46 on A21 for minimum intermodulation products of 45.75 MHz and 43 MHz. See Fig. 4-42.

8. Adjust Narrow IF SAW Amp Bias (R76 on A24) (SN B010000 to B010774 only)

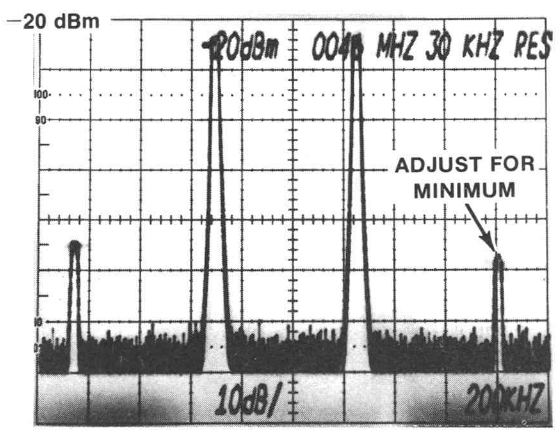
a. Connect the test equipment as shown in Fig. 4-43. Connect point "A" in Fig. 4-43 to the 7L13 RF In. Set the HP 8640B RF Output level and SG 503 Output level at −20 dBm as viewed on the 7L13.



1450-1 IF	HP 8640B FREQUENCY	SG 503 FREQUENCY
37 MHz	37 MHz	36.5 MHz
38.9 MHz	38.9 MHz	38.4 MHz
45.75 MHz	45.75 MHz	45.25 MHz

2200-71

Fig. 4-41. Test Setup for Adjusting IF Atten/Amp Bias (R21).



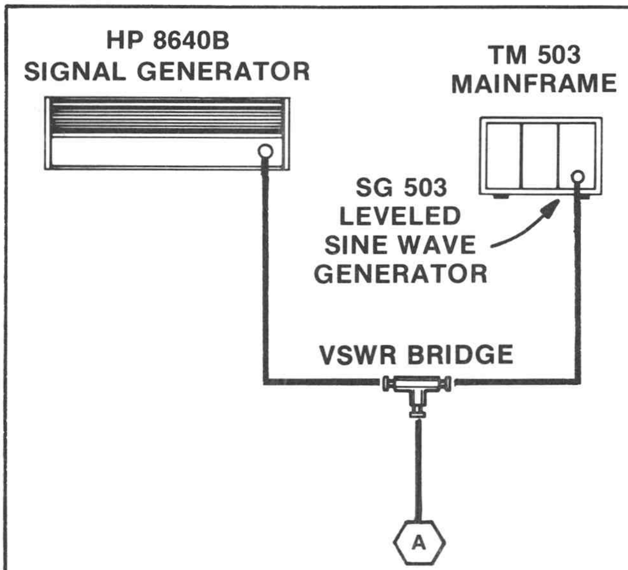
VERT MODE = 10 dB/DIV
CENTER FREQ = 45 MHz
RESOLUTION = 30 kHz

2200-72

Fig. 4-42. Waveform for Adjusting Bias on A21.

b. Remove A23 from the 1450-1 and, connect point "A" in Fig. 4-43 to output pins (pin 10 labeled OUT NARROW/pin 11 = Ground) in A23 location. Remove A26 from the 1450-1 IF chain. Monitor the input pins (pin 4 labeled IN NARROW/pin 3 = Ground) in A26 location with the 7L13 using the BNC-to-Square Pin Adapter cable. Push in (SOUND TRAP) IN button.

c. Adjust R76 on A24 for minimum intermodulation products of 26.55 MHz and 26.0 MHz. See Fig. 4-44.



HP 8640B SIGNAL GENERATOR

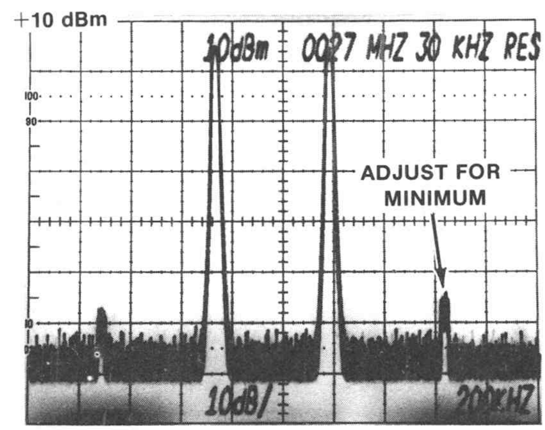
FREQUENCY . . . . 26.0 MHz

SG 503 LEVELED SINE WAVE GENERATOR

FREQUENCY . . . . 26.5 MHz

2200-73

Fig. 4-43. Equipment Setup to Adjust Bias on A24, A25, and A26. (A24, A25 also for SN B010000 to B010774 only).



VERTICAL MODE = 10 dBm/DIV
CENTER FREQUENCY = 27 MHz
RESOLUTION = 30 kHz
FREQUENCY SPAN = 200 kHz

2200-74

Fig. 4-44. Waveform for Adjusting Bias on A24, A25, and A26. (A24, A25 also for SN B010000 to B010774 only).

9. Adjust Wide IF SAW Amp Bias (R76 on A25) (SN B010000 to B010774 only)

a. Connect the test equipment as shown in Fig. 4-43. Connect point "A" in Fig. 4-43 to the 7L13 RF In. Set the HP 8640B RF Output level and SG 503 Output level at −20 dBm as viewed on the 7L13.

b. Remove A23 from the 1450-1, and connect point "A" in Fig. 4-43 to output pins (pin 12 labeled OUT WIDE/pin 11 = Ground) in A23 location. Remove A26 from the 1450-1 IF chain. Monitor the input pins (pin 2 labeled IN WIDE/pin 1 = Ground) in A26 location with the 7L13 using the BNC-to-Square Pin Adapter cable. Push in the (SOUND TRAP) OUT button.

c. Adjust R76 on A25 for minimum intermodulation products of 26.5 MHz and 26.0 MHz. See Fig. 4-44.

10. Adjust Post Amp Bias (R64 on A26)

a. Connect the test equipment as shown in Fig. 4-43. Connect point "A" in Fig. 4-43 to the 7L13 RF In. Set the HP 8640B RF Output level and SG 503 Output level at −20 dBm as viewed on the 7L13.

b. Remove A25 from the 1450-1, and connect point "A" in Fig. 4-43 to output pins (pin 5 labeled OUT/pin 6 = Ground) in A25 location. Remove A27 from the 1450-1 IF chain. Monitor the input pins (pin 12 labeled IN/pin 11 = Ground) in A27 location with the 7L13 using the BNC-to-Square Pin Adapter cable.

c. Adjust R64 on A26 for minimum intermodulation products of 26.5 MHz and 26.0 MHz. See Fig. 4-44.

NOTE

The IF bandpass filters on A20 and A23 are difficult to adjust. Hence, the following precautionary steps must be taken before these filters are adjusted.

Check to make certain that the IF Attenuator board (A21) is operating properly before attempting to adjust the IF Input Bandpass Filter on A20. If the IF Attenuator board is working properly, check to see whether the bandpass filter is within instrument specification or not. IT IS SUGGESTED THAT THE BANDPASS FILTERS BE ADJUSTED ONLY WHEN THEY ARE OUT OF INSTRUMENT SPECIFICATION because of the difficulty in adjusting these filters.

Before adjusting these filters, connect the appropriate capacitors across the adjustable coils, one at a time. Note the notch frequencies. These will help in establishing repeatable starting points.

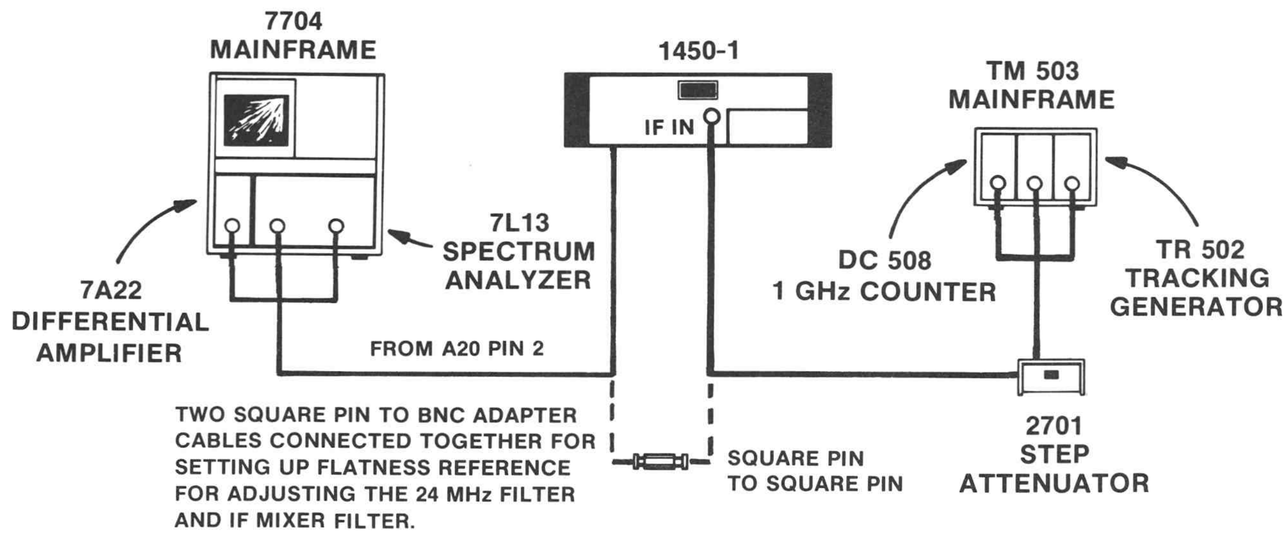
a. It will be necessary to set up a reference flatness trace and to calibrate the vertical amplifier plug-in for 0.2 dB/div using the TR 502 Tracking Generator or any other comparable signal source.

b. Refer to Fig. 4-45. Connect the TR 502 to the 1450-1 through a 2701 Step Attenuator. Set the TR 502 Output Level at 00 dBm. Remove A20 from the 1450-1, and connect the 7L13 RF In to pin 2 (marked IN/pin 3 = Ground) in A20 location. Set the 2701 for 18 dB attenuation and set the 7L13 according to Fig. 4-45.

c. Connect the 7L13 Video Out to the 7A22 vertical plug-in positive input, and set the 7A22 vertical sensitivity at 2 mV. Push in the Left Vertical Mode button on the test oscilloscope mainframe and use the 7A22 DC Offset control to bring the trace within the crt viewing area.

d. Vary the 7A22 Variable Volts/Div control for a 5 division excursion of the trace as 1 dB of attenuation is added and removed from the 7L13 input signal. Attenuation may be added and removed with the 2701 Step Attenuator. The test oscilloscope is now calibrated for 0.2 dB/div, allowing for any cable losses.

e. Use a grease pen to mark the trace on the implosion shield or graticule. This will be the reference flatness for adjusting the IF filters.



7L13 SPECTRUM ANALYZER

FREQ SPAN/DIV . . . . 1 MHz
Hz RESOLUTION . . . . 3 MHz
REFERENCE LEVEL . . . . −10 dBm
RF dB . . . . +20
CENTER FREQUENCY . . . . SEE TABLE

TR 502 TRACKING GENERATOR

OUTPUT LEVEL . . . . −18 dBm
VAR dB 0

CENTER FREQUENCY

	OPTION 1	OPTION 2	OPTION 3
IF FILTER & MIXER	35.25 MHz	37.15 MHz	44.0 MHz
24 MHz FILTER	25.5 MHz	25.5 MHz	25.5 MHz

2200-75

Fig. 4-45. Equipment Setup to Adjust IF Bandpass Filters.

11. Adjust IF Filter (L22, L32, L45, L52, L62, C35, and C55 on A20 IF Filter Amp board)

a. Set up the 0.2 dB/div reference flatness. Refer to Fig. 4-45, and associated text. Bandpass response is adjusted from the IF INput to the output of A21 for bandwidth and gain determined by the table below:

Option	Bandpass MHz				
	IF	Low	Center	High	Gain
1	37 MHz	31.75	35.25	38.75	≈21 dB
2	38.9 MHz	33.65	37.15	40.65	≈21 dB
3	45.75 MHz	40.5	44.00	47.5	≈21 dB

b. Remove A22 IF Mixer board from the 1450-1 and connect a BNC-to-Square Pin Adapter cable (175-2140-00) from pin 1 (labeled IN) in A22 location to the 7L13 RF In connector.

c. Connect the 7L13 Video Out to the 7A22 (+) input and dial the 7L13 Center Frequency to the 1450-1 IF bandpass center.

d. Set the 7L13 RF dB to +20 and the Reference Level to −10 dBm. Push in the Left Vertical Mode on the test oscilloscope mainframe and use the DC Offset control on the 7A22 to bring the display within the crt viewing area. Set the 2701 Step Attenuator to 30 dB.

e. Adjust L22, L32, L45, L52, L62, C35, and C55 on A20 for flatness within 0.1 dB of the grease pen trace, and bandwidth determined according to the preceding table.

f. Remove the cable from pin 1 in A22 location, and replace A22.

12. Adjust IF Mixer Filter (L43, L36, and C45 or L33, L36, and C48 on A22 Mixer board)

a. Set up the 0.2 dB/div reference flatness.

Option	Bandpass MHz			
	IF	Low	Center	High
1	37 MHz	31.75	35.25	38.75
2	38.9 MHz	33.65	37.15	40.65
3	45.75 MHz	40.5	44.00	47.5

b. Remove A21 from the 1450-1 on the IF Interconnect board, and connect a TR 502 to pin 5 (labeled OUT) in A21 location through a 2701 Attenuator. Set the 7L13 Center Frequency at the 1450-1 IF center frequency. Remove P53 jumper on A22 and connect a BNC-to-Square Pin Adapter cable from P53 pins 1 and 4 to the 7L13 RF In. Set the 2701 Step Attenuator to 0 dB attenuation.

c. Push in the Left Vertical Mode on the test oscillsocope mainframe and use the DC Offset control on the 7A22 to bring the display within the crt viewing area.

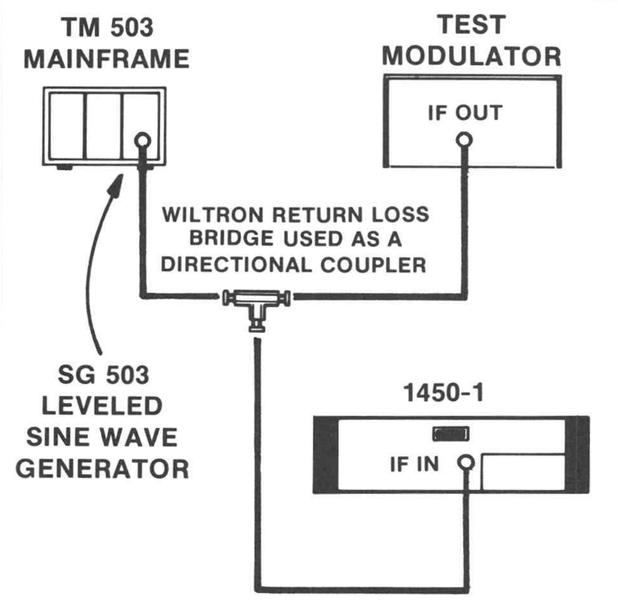
d. Adjust L43, L36, and C45 or L33, L36, and C48; depending on the IF Mixer board in the 1450-1; on A22 for flatness within 0.1 dB of the grease pen trace.

e. Remove the cable from pin 5 in A21 location, replace P53 jumper on A22, and replace A21.

13. Adjust IF Mixer Balance (C63 and R51 on A22 IF Mixer)

a. Connect the test equipment as shown in Fig. 4-46. Connect the 1450-1 VIDEO OUT to the 7L13, and set the 7L13 Reference Level at −10 dBm, RF dB at +20, Log at 10 dB/div, Center Frequency at 6 MHz, Freq Span/Div at 50 kHz, and Hz Resolution at 300 kHz.

b. Adjust C63 and R51 for minimum intermediate frequency feed-through. It may be necessary to select either R52 or R53 to increase the range of R51. In most cases, it is sufficient to remove R52 or R53 from the circuit and readjust R51.



SG 503 LEVELED SINE WAVE GENERATOR

FREQUENCY .... 30 MHz
AMPLITUDE .... SAME AS TEST MODULATOR

1450-1 DEMODULATOR

DETECTION MODE .... SYNCHRONOUS BACK PORCH
SOUND TRAP .... OUT
AUTO AGC .... BACK PORCH

TEST MODULATOR

VISUAL CARRIER .... ON

2200-76

Fig. 4-46. Equipment Setup to Adjust Mixer Balance.

14. Adjust 24 MHz Bandpass Filter (L58, L54, L51, L61, C48, C44, and C41 on A23 IF Switch/Aural Drive board)

a. Set up the 0.2 dB/div reference flatness. Refer to Fig. 4-45, and the associated text.

b. Remove A22 from the 1450-1 on the IF Interconnect board. Connect the TR 502 to pin 8 (labeled OUT, pin 7 = Ground) in A22 location on the IF Interconnect board through the 2701. See Fig. 4-45.

c. Remove A24 (IF SAW Amp board) from the 1450-1 on the IF Interconnect board, and connect a BNC-to-Square Pin Adapter cable (175-2140-00) from pin 11 (labeled IN, pin 10 = Ground) in A24 location to the 7L13 RF In connector.

d. Connect the 7L13 Video Out to the 7A22 (+) input and set the 7L13 Center Frequency at 25.5 MHz.

e. Push in the Left Vertical Mode on the test oscilloscope mainframe and use the DC Offset control on the 7A22 to bring the display within the crt viewing area. Push in the 1450-1 SOUND TRAP IN button, and set the 2701 Step Attenuator to 00 dB.

f. Adjust L58, L54, L51, C48, L62, C44, and C41 on A23 for flatness within 0.1 dB of the grease pen trace, and a bandwidth of from at least 22.0 MHz to 29.0 MHz (center = 25.5 MHz).

g. Remove the cable from pin 11 in A24 location and replace A24 and A22 on the IF Interconnect board.

15. Adjust Video Detector Low Pass Filter (L44, L54, and L64 on A29 Det-Video Amp Board)

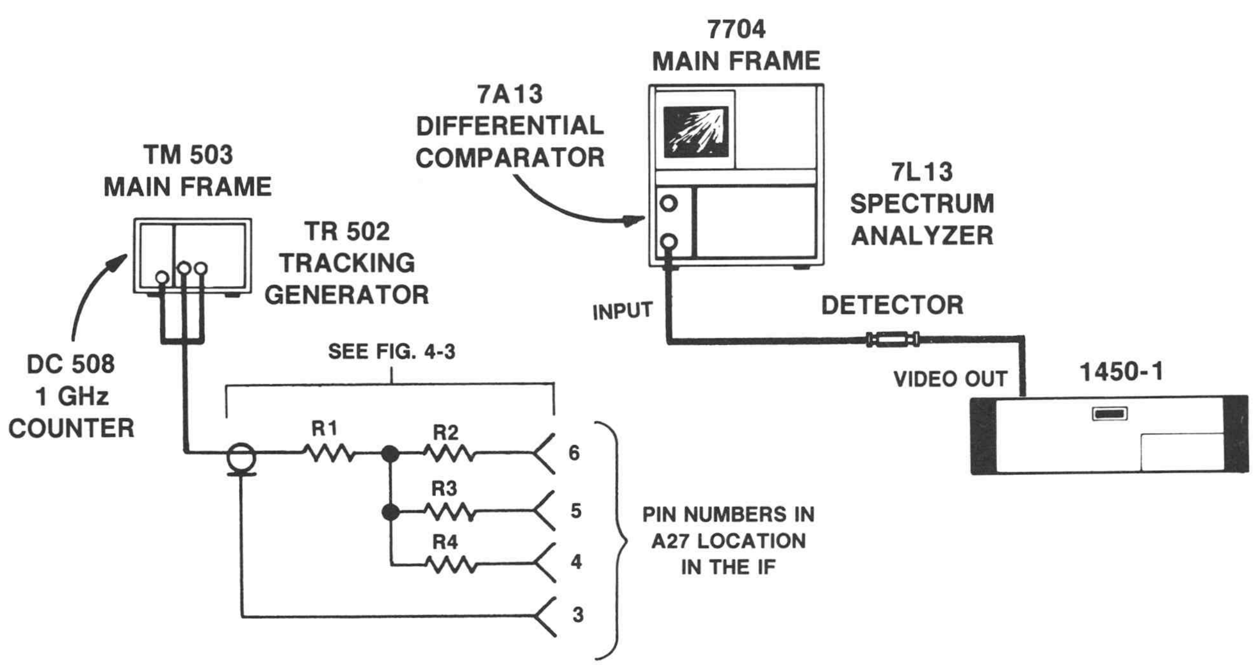
a. Remove A27 from the 1450-1 and connect the test equipment as shown in Fig. 4-47. Remove the detector from the test setup.

b. Set the TR 502 output level controls for a 2 V p-p display on the test oscilloscope. See Fig. 4-48.

c. Replace the detector in the test setup, and set the 7A13 Volts/Div control at 10 mV. Use the Comparison Voltage control on the 7A13 to bring the display within the viewing area. See Fig. 4-49.

d. Adjust L44, L54, and L64 on A29 for flat response within 1 division from 19 MHz to 29 MHz. See Fig. 4-49. The intensified dot on the display may be used to locate the frequency limits on the trace by varying the 7L13 Center Frequency control and reading off the frequency counter.

e. Disconnect all test equipment, and replace all circuit boards in their respective locations in the 1450-1 unless proceeding to step 16.



TR 502 TRACKING GENERATOR

OUTPUT LEVEL	−10 dBm
VAR dB	0
DOT INTENSITY	ON

7A13 DIFFERENTIAL COMPARATOR

VOLTS DIV	10 mV

7L13 SPECTRUM ANALYZER

FREQ SPAN/DIV	2 MHz
CENTER FREQUENCY	24 MHz
TIME/DIV	10 ms

7704 MAIN FRAME

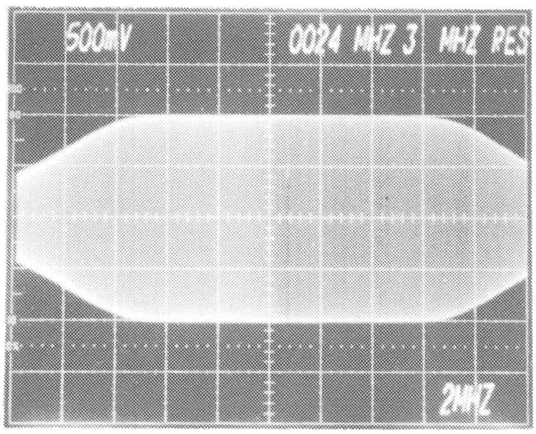
VERTICAL MODE	LEFT

2200-175

Fig. 4-47. Test Instrument Setup for Adjusting the Video Detector Low Pass Filters.

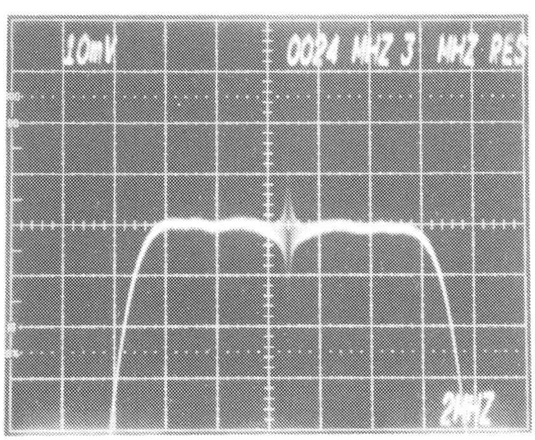
d. Set the test oscilloscope mainframe Trigger Source and Vertical Mode to either left or right depending on the location of the 7A18 in the test oscilloscope.

e. Adjust the variable output on the sweep generator for a 2 V display on the test oscilloscope. See Fig. 4-48. Now connect the 1450-1 VIDEO OUT to the 7A13 vertical plug-in through the detector, and change the test oscilloscope vertical sensitivity to 10 mV/div. Use the 7A13 Comparison Voltage control to bring the display within the crt viewing area. See Fig. 4-49.



2200-78

Fig. 4-48. Setup Waveform for Adjusting Video Detector Low Pass Filters on A29 and A28.



2200-79

Fig. 4-49. Waveform for Adjusting Video Detector Low Pass Filters on A29 and A28.

f. Adjust L44, L54, and L64 on A29 for flat response from the zero beat note to 5 MHz above as viewed on the trace. See Fig. 4-49. The frequency marker may be used to locate the frequency limits on the trace by varying the SG 503 frequency.

g. Disconnect all test equipment, and replace all circuit boards in their respective locations in the 1450-1 unless proceeding to step 34.

16. Adjust Quadrature Detector Low Pass Filter (L44, L54, and L64 on A28 Det-Video Amp Board)

NOTE

The Quadrature Detector low pass filter should be adjusted with the board (A28) installed in A29 location on the IF strip. This is done so that A28 can be substituted for A29 should A29 fail.

The two boards (A28 and A29) are identical except for the jumpered pins on P71. The basic board becomes a video detector when pins 1 and 2 on P71 are jumpered, and quadrature detector when pins 2 and 3 are jumpered.

a. Remove the video and quadrature detector boards (A28 and A29) from the 1450-1. Install the quadrature detector board in A29 location, and move P71 jumper to pins 1 and 2. At the same time, install the video detector board in A28 location, and move P71 jumper to pins 2 and 3.

b. Adjust L44, L54, and L64 on the board in A29 location for a flat response within 1 division from 19 MHz to 29 MHz. See Fig. 4-49.

17. Adjust Video-to-Quadrature Phase (L48, C10, and L13 on A27 IF Zero Carrier/Phase Shifter board)

a. Connect the test equipment as shown on Fig. 4-50. Remove P34 jumper from A52, and connect the wiper arm of R1000 to P34-2 on A52. Set R1000 for maximum H-sync amplitude on the 1480 display.

b. Push in CONT (DETECTION MODE) and MAN on the 1450-1 front panel, and set the GAIN control such that the Range Lights on the RF SIGNAL INPUT LEVEL readout are off.

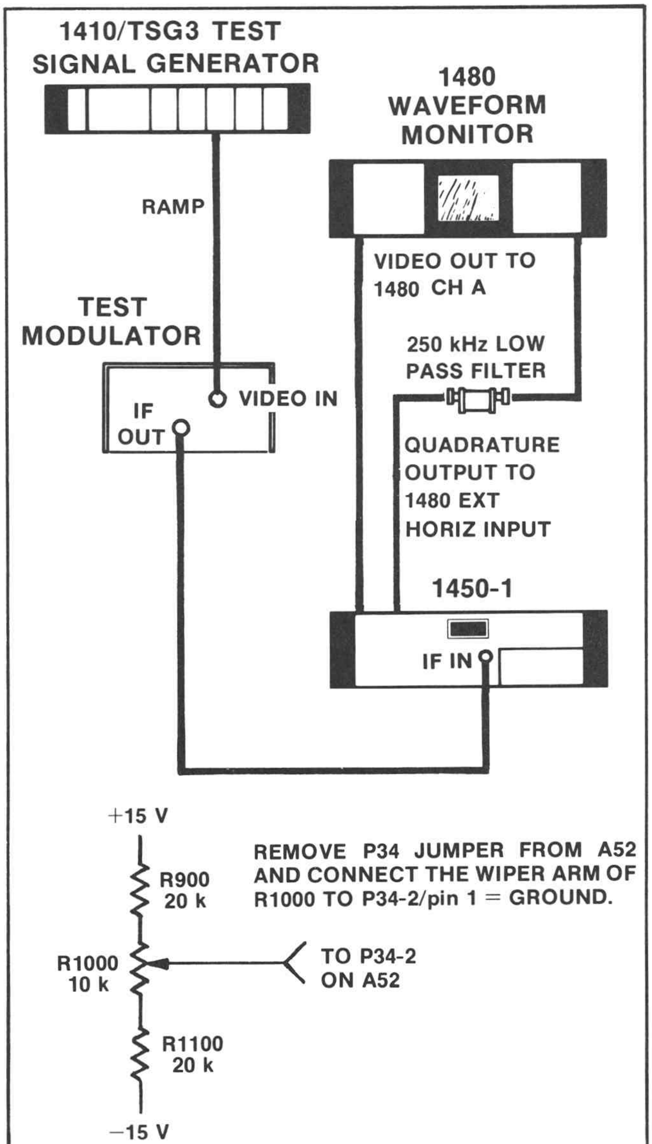
c. Adjust L48 on A27 for maximum H-sync amplitude on the 1480 display.

d. Set the 1480 Display control to Ext. Vary C10 on A27 clockwise and counterclockwise, and note how far the phase display swings to the left and to the right.

e. Adjust C10 on A27 for midrange of the phase display swing.

f. Adjust L13 for a vertical display on the test oscilloscope. See Fig. 4-51. Note that L21 and L25 on A27 normally do not have adjustable cores.

g. Disconnect the test equipment from the 1450-1, and replace P34 jumper on A52.



1450-1

SYNCHRONOUS DETECTION MODE
SOUND TRAP . . . . IN
AUTO AGC . . . . BACK PORCH

1410/TSG3 TEST SIGNAL GENERATOR

SET UP FOR A RAMP OUTPUT

1480 WAVEFORM MONITOR

INPUT . . . . CH A DC CPL'D
VOLTS FULL SCALE 0.2
MAG . . . . OFF
DISPLAY . . . . (STEPS 17A THROUGH 17C) 5 μs
(STEPS 17D THROUGH 17F) EXT
RESPONSE . . . . . (STEPS 17A THROUGH 17C) FLAT
(STEPS 17D THROUGH 17F) LOW PASS

2200-80

Fig. 4-50. Equipment Setup to Adjust L48, C10, and L13 on A27.

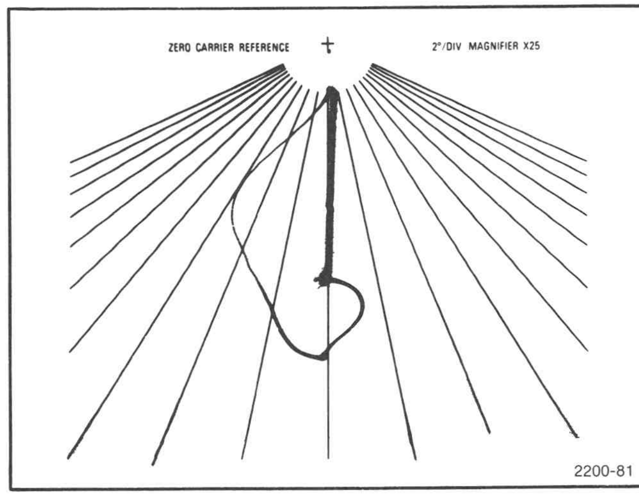


Fig. 4-51. Adjustment Display for L48, C10, and L13 on A27.

18. Adjust Limiter (R00, R30, and R50 on A55 Limiter board)

a. Refer to Fig. 4-52. Connect the ramp output from the 1410 to the test modulator Video In, and connect the test modulator IF Out to the 1450-1 IF IN through a 20 dB attenuator. Push in the ENV (DETECTION MODE), and MAN (AGC) buttons on the 1450-1 front panel.

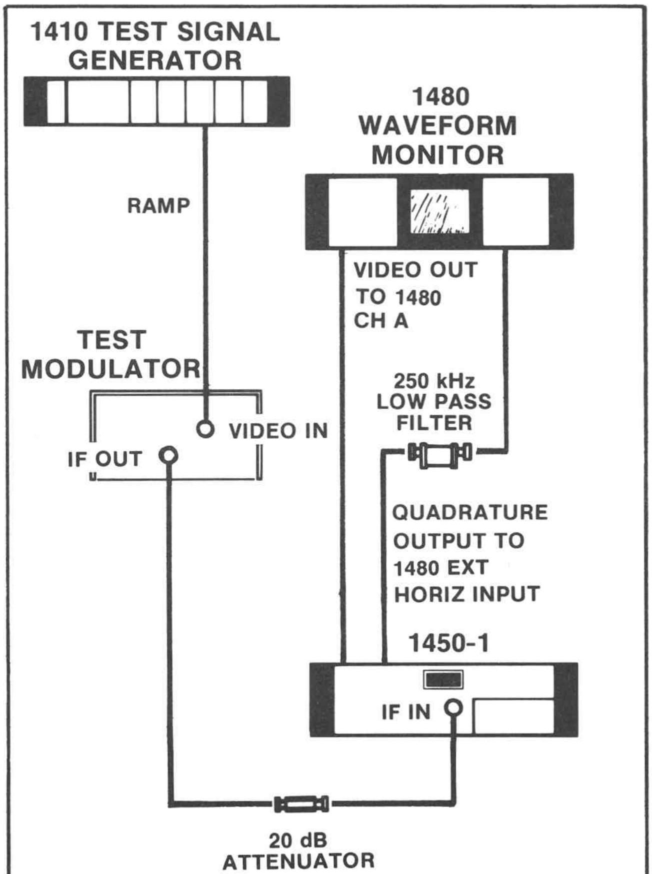
b. Connect the 1450-1 VIDEO OUTPUT to the 1480 Ch A input, and connect the 1450-1 QUADRATURE OUTPUT to the 1480 External Horiz In through a 250 kHz low pass filter (Tektronix Part No. 015-0532-00). Set the 1480 Response switch to Low Pass, Input to A DC CPL'D, Volts Full Scale to 1.0, and Display to Ext.

c. Adjust R00, R30, and R50 for a straight phase display while varying the 1450-1 MANual GAIN control between normal and minimum signal amplitude.

19. Adjust IF Delay (L98 on A27 IF Zero Carrier/ Phase Shifter board)

a. Refer to Fig. 4-52. Connect the Linearity output from the 1410 to the Modulator Video In, and connect the Modulator IF Out to the 1450-1 IF IN. Push in the ENV and INTR buttons on the 1450-1 front panel.

b. Connect 1450-1 VIDEO OUT to the 1480 CH A input and terminate in 75 Ω. Connect QUADRATURE OUT through a Low Pass Filter (Tektronix Part No. 015-0352-00) to the 1480 Ext Horiz In. Set the 1480 Response switch to Low Pass.



1450-1

DETECTION MODE .... ENV
SOUND TRAP .... IN
INTERNAL ZERO CARRIER REF .... ON
AGC .... MAN

TEST MODULATOR

VISUAL CARRIER .... ON

1480 WAVEFORM MONITOR

RESPONSE .... LOW PASS
INPUT .... A
VOLTS FULL SCALE 1.0
DISPLAY .... EXT

2200-82

Fig. 4-52. Equipment Setup to Adjust R00, R30, and R50 on A55, and L98 on A27.

c. Adjust L98 on A27 for zero phase error between ENV and SYNCHRONOUS DETECTION MODEs. Hold the 1450-1 SYNC TIP (SYNCHRONOUS DETECTION MODE) button in while pushing and releasing the ENV button, and adjust L98 for minimum movement of sync tip phase shift.

NOTE

L98 must be adjusted in the extrusion. If it is adjusted while on an extender card, it will be misadjusted in the extrusion.

To adjust properly, remove the board from the extrusion, adjust L98 a small amount, re-install in the extrusion, and check phase.
Repeat until phase is correct.

20. Adjust Quadrature DC Level (R60 on A28 IF Det-Video Amp board)

a. Refer to Fig. 4-52. Connect the Linearity output from the 1410 to the Modulator Video In, and connect the Modulator IF Out to the 1450-1 IF IN through a 10 dB pad. Push in the ENV and INTR buttons on the 1450-1 front panel.

b. Connect 1450-1 VIDEO OUT to the 1480 CH A input and terminate in 75 Ω. Connect QUADRATURE OUT through a Low Pass Filter (Tektronix Part No. 015-0352-00) to the 1480 Ext Horiz In. Set the 1480 Response switch to Low Pass.

c. Push in CONT (DETECTION MODE) on the 1450-1 front panel, and set the MANual GAIN control such that the Range Lights on the 1450-1 RF SIGNAL INPUT LEVEL readout are both out.

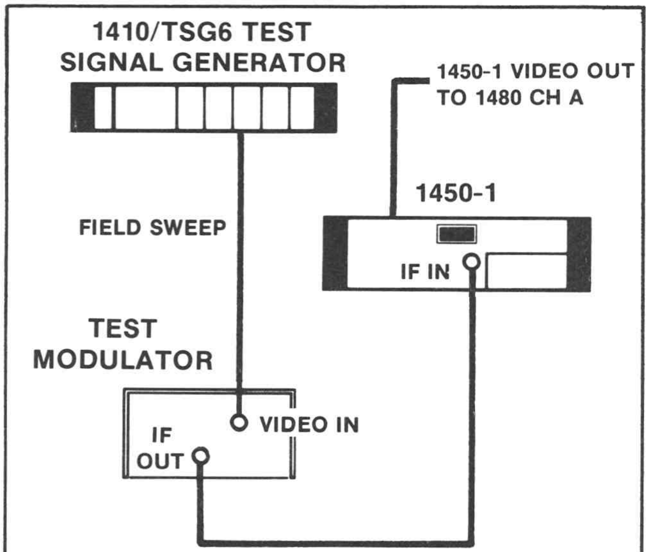
d. Adjust R60 on A28 for no phase shift as the MANual GAIN control is varied down from normal setting.

21. Adjust Narrow Band and Wide Band Frequencies (R50 and R40 on A50 Ref Control board)

a. Connect the test equipment as shown in Fig. 4-53. Push in the SOUND TRAP IN button on the 1450-1 front panel.

b. Adjust R50 on A50 for a linear field sweep display on the 1480 Waveform Monitor. See Fig. 4-54 for comparative waveforms.

c. Push in the SOUND TRAP OUT button on the 1450-1 front panel.



1410/TSG6 TEST SIGNAL GENERATOR

FREQ RANGE . . . . LOW (IN)
MARKERS . . . . ON (IN)
COMPOSITE/CONTINUOUS . . . . COMPOSITE (IN)
SWEEP . . . . ON (IN)

1480 WAVEFORM MONITOR

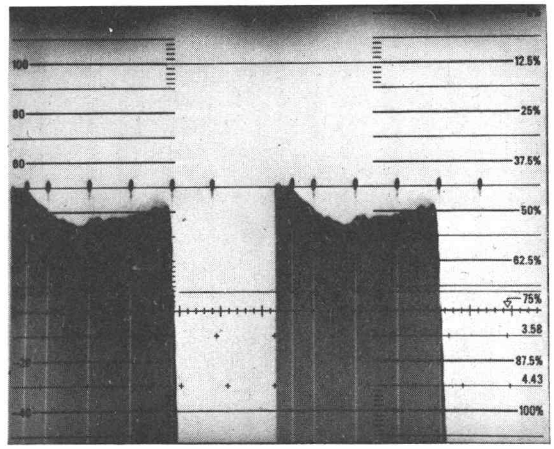
Set up 1480 for 2 Field Display.

1450-1

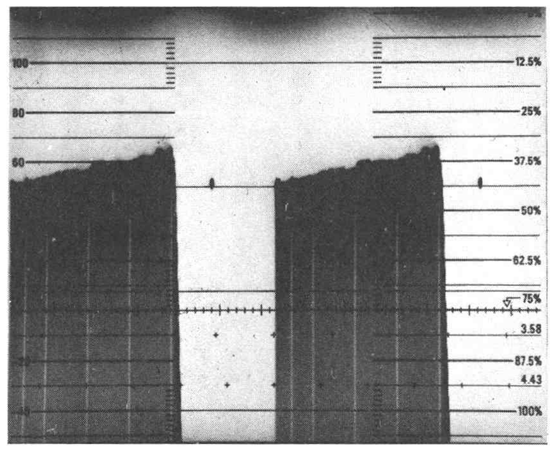
DETECTION MODE . . . . SYNCHRONOUS
SOUND TRAP . . . . IN
AUTO AGC . . . . BACK PORCH

2200-83

Fig. 4-53. Setup for Adjusting Wide Band and Narrow Band Frequencies.



(a) R50 on A50 misadjusted.



(b) R50 on A50 adjusted.

2200-84

Fig. 4-54. Comparative Waveforms for Adjustment of R50 on A50.

d. Adjust R40 on A50 for a linear field sweep display on the 1480 Waveform Monitor. See Fig. 4-55 for comparative waveforms.

NOTE

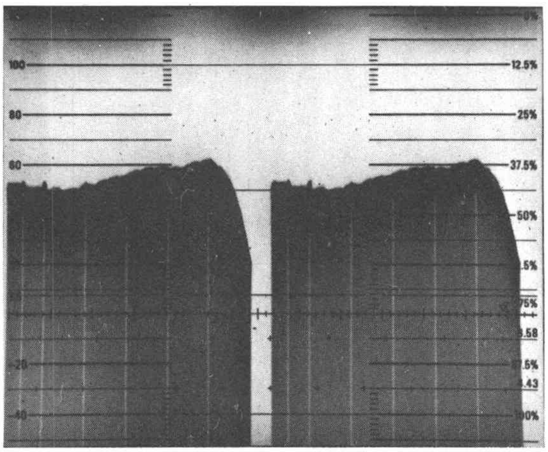
After adjustment of R50 or R40, the display may be flat, tilted down, or tilted up. That is normal since R50 and R40 adjust linearity only, and not flatness.

22. Adjust IF Mixer Filter (L33, L36, and C48 on A22 IF Mixer board Option 2 Only) (L43, L36, and C45 on A22 IF Mixer board Options 1 and 3)

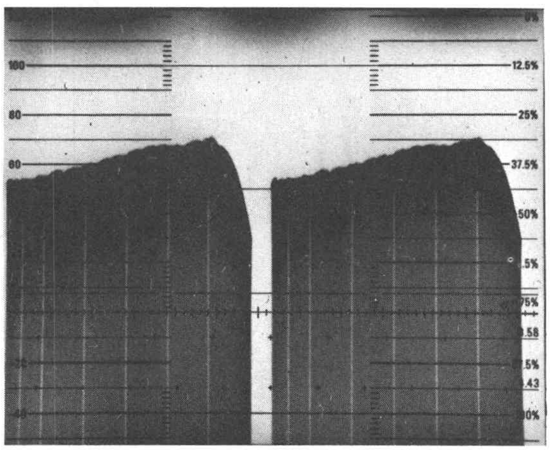
a. Connect the test equipment as shown in Fig. 4-56. Push in the SOUND TRAP OUT button on the 1450-1 front panel.

b. Adjust L33, L36, and C48 on A22 for flatness of the waveform displayed on the 1480. In instruments with serial numbers below B010402, adjust L43, L36, and C45 on A22. See Fig. 4-57.

@



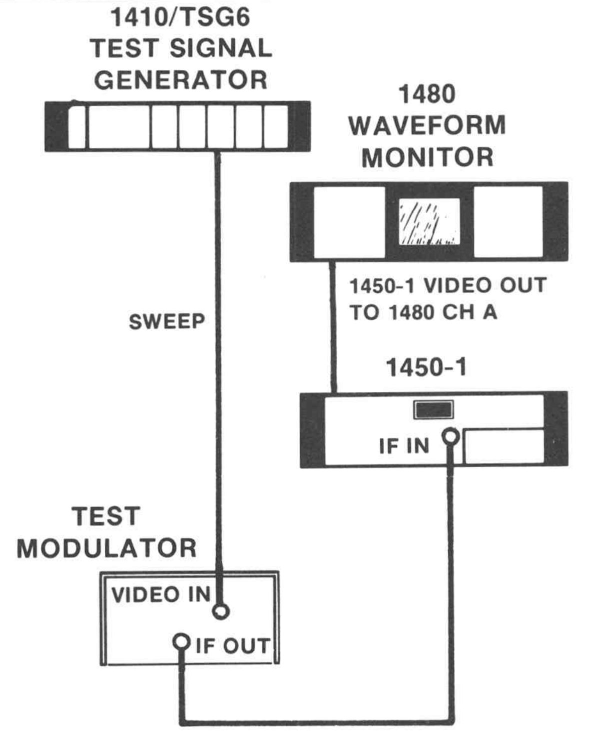
(a) R40 on A50 misadjusted.



(b) R40 on A50 adjusted.

2200-85

Fig. 4-55. Comparative Waveforms for Adjustment of R40 on A50.



1410/TSG6 TEST SIGNAL GENERATOR

FREQ RANGE . . . . LOW (IN)
MARKERS . . . . ON (IN)
COMPOSITE/CONTINUOUS . . . . ON (IN)

1480 WAVEFORM MONITOR

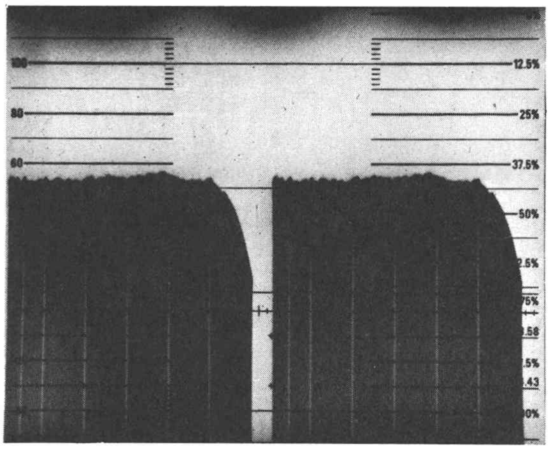
RESPONSE . . . . FLAT
INPUT . . . . A DCPL'D
VOLTS FULLL SCALE 0.2
MAG . . . . OFF
DISPLAY . . . . 2 FIELD

1450-1

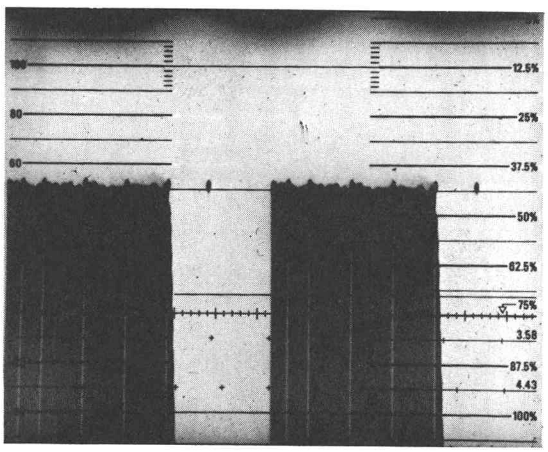
SYNCHRONOUS DETECTION MODE . . . BACK PORCH
SOUND TRAP . . . . OUT
AUTO AGC . . . . BACK PORCH

2200-86

Fig. 4-56. Equipment Setup for Adjusting Mixer Filter on A22.



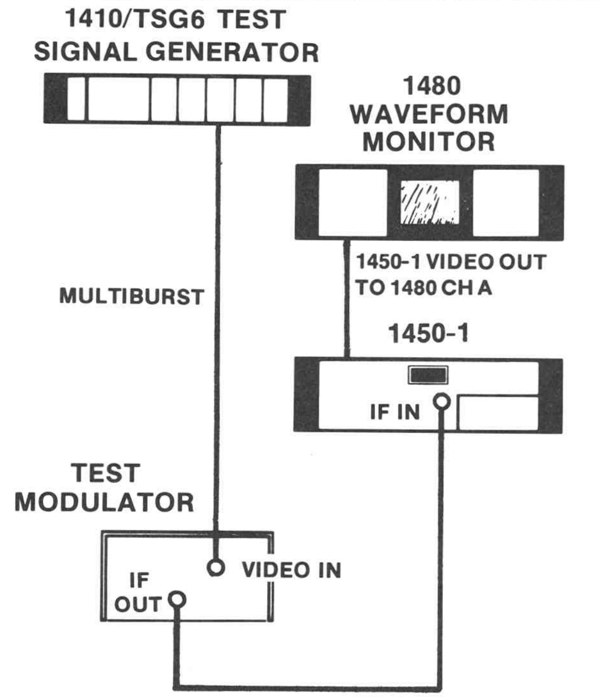
(a) Wide Band (SOUND TRAP OUT) display after adjusting the Mixer Filter on A22.



(b) Narrow Band display (SOUND TRAP IN).

2200-87

Fig. 4-57. Mixer Filter Adjustment Waveforms.



1410/TSG6 TEST SIGNAL GENERATOR

FREQ RANGE . . . . LOW
AMPL . . . . FULL
MULTIBURST . . . . IN

1450-1

DETECTION MODE . . . . ENV
SOUND TRAP . . . . IN
AUTO AGC . . . . BACK PORCH

2200-88

Fig. 4-58. Setup for Adjusting VIDEO OUT and QUADRATURE OUT Balance (R11 on A28 and A29).

23. Adjust Detector Balance (R11 on A28 and A29 IF Det-Video Amp boards)

a. Connect the test equipment as shown in Fig. 4-58. Connect the 1410 Multiburst output to the test modulator Video In. Push in the 1450-1 ENV (DETECTION MODE) button. Set the 1480 Horizontal Position control to display the 6th burst packet.

b. Adjust R11 on A29 for a distortion-free display on the 1480. See Fig. 4-59.

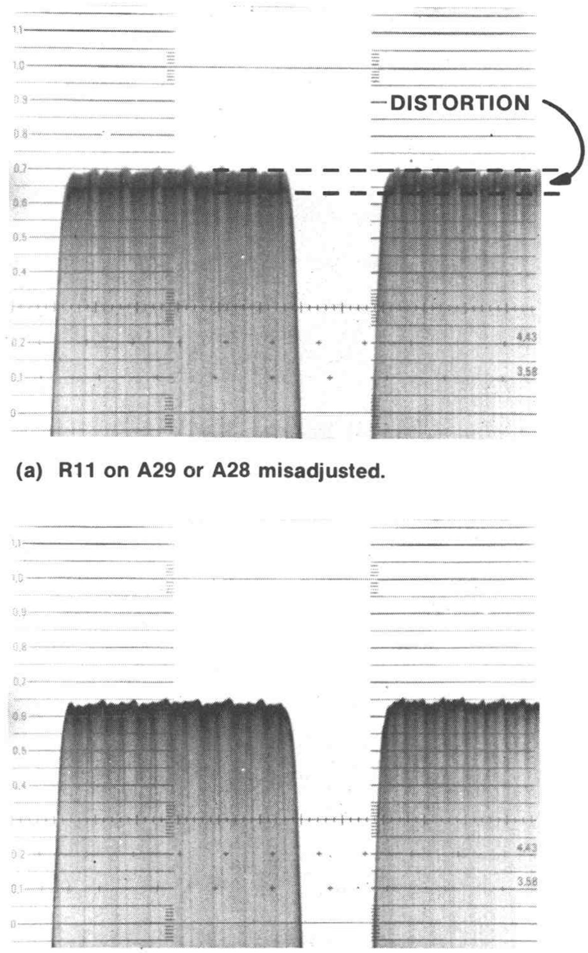
c. Remove A29 from the 1450-1, and insert A28 in A29 location. Move jumper on P71-1 and 2 to P71-2 and 3. Insert A29 in A28 location.

d. Adjust R11 on A28 for a distortion-free display on the 1480. See Fig. 4-59. Replace the boards (A28 and A29) in their original locations after resetting the jumpers at P71 as per the table below:

A29 Video Det-Amp—Jumper pins 1 and 2 on P71.

A28 Quad Det-Amp—Jumper pins 2 and 3 on P71.

@



(a) R11 on A29 or A28 misadjusted.

(b) R11 on A29 or A28 adjusted.

2200-89

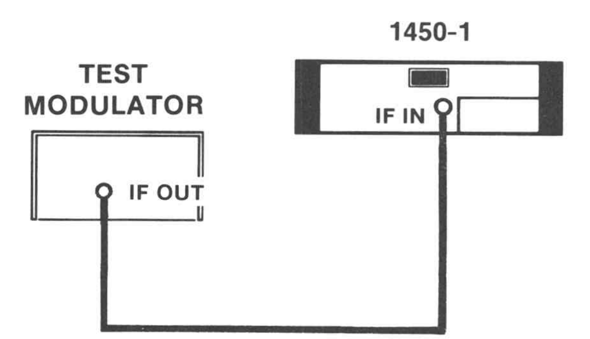
Fig. 4-59. Comparative Waveforms Showing Effect of Adjusting R11 on A29 and A28.

24. Adjust Video Amp DC Level (R60 on A29)

a. Connect the test equipment as shown in Fig. 4-60.

b. Monitor VIDEO OUT with the DM 502. Note the DM 502 reading, and add 1.714 V to it. Disconnect the test modulator from the 1450-1 IF IN.

c. Adjust R60 on A29 for the total dc level arrived at in part b above using the DM 502.



TEST MODULATOR

VISUAL CARRIER . . . . ON (≈−25 dBm)

1450-1

SYNCHRONOUS DETECTION MODE . BACK PORCH
SOUND TRAP . . . . IN
AUTO AGC . . . . BACK PORCH

2200-90

Fig. 4-60. Equipment Setup to Adjust R60 on A29.

25. Adjust Switch Current Balance (R72 on A27)

a. Connect the test equipment as shown in Fig. 4-61. Monitor the 1450-1 VIDEO OUT with the 1480 Waveform Monitor.

b. Adjust R72 on A27 for the best zero-carrier risetime with no preshoot or overshoot.

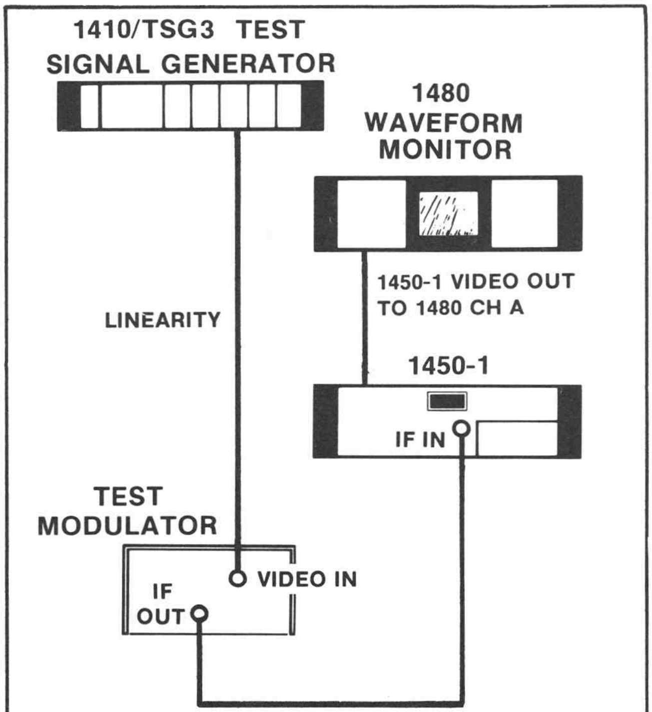
26. Adjust Phase Shifter Quadrature (L98 on A52 Phase Shifter board)

a. Remove P34 jumper from A52 Phase Shifter board, and connect the SG 502 output to P34-2/pin 1 = Ground using a BNC-to-Square Pin Adapter cable. Set the SG 502 output level at 5 V P-P, and frequency at 1 kHz.

b. Monitor the output of A52 Phase Shifter board at pin 6 with the test oscilloscope. Set the test oscilloscope Time/Div at 0.5 ms, and externally trigger the test oscilloscope with the SG 502 rectangular wave output.

c. Adjust L98 on A52 Phase Shifter board for minimum 1 kHz amplitude modulation at the output of the Phase Shifter board (pin 6) as viewed on the test oscilloscope. See Fig. 4-62.

d. Remove the BNC-to-Square Pin Adapter cable from P34-2, and replace the jumper to P34.



1450-1

SYNCHRONOUS DETECTION MODE
SOUND TRAP .... IN
AUTO AGC .... BACK PORCH

1410/TSG3 TEST SIGNAL GENERATOR

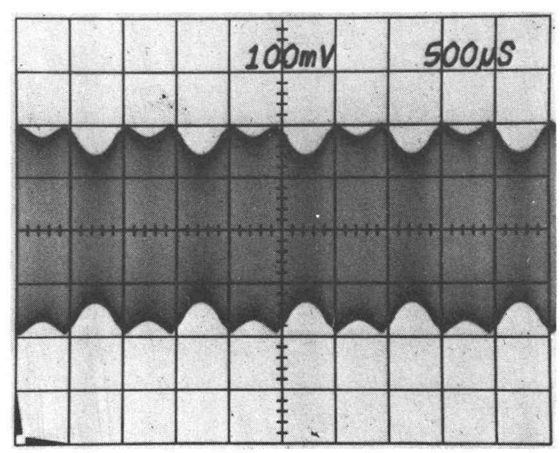
SET UP FOR A 5 STEP LINEARITY OUTPUT.

1480 WAVEFORM MONITOR

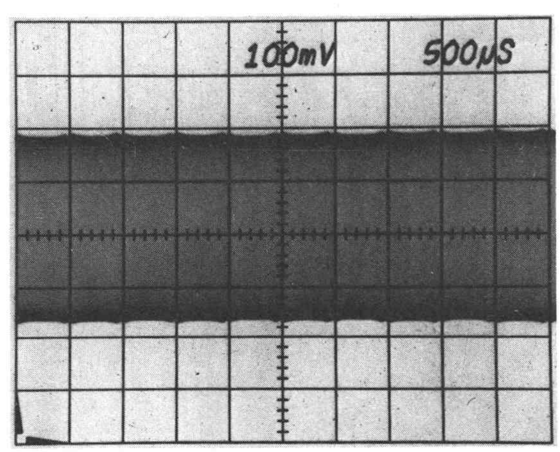
INPUT .... CH A DC CPL'D
VOLTS FULL SCALE 0.2
MAG .... OFF
DISPLAY .... 5 μs
LINE SELECTOR .... DIG (IN)
LINE SELECTOR CONTROL .... SET AT LINE 20

2200-91

Fig. 4-61. Setup for Adjusting Switch Current Balance (R72 on A27).



(a) L98 on A52 misadjusted.



(b) L98 on A52 adjusted.

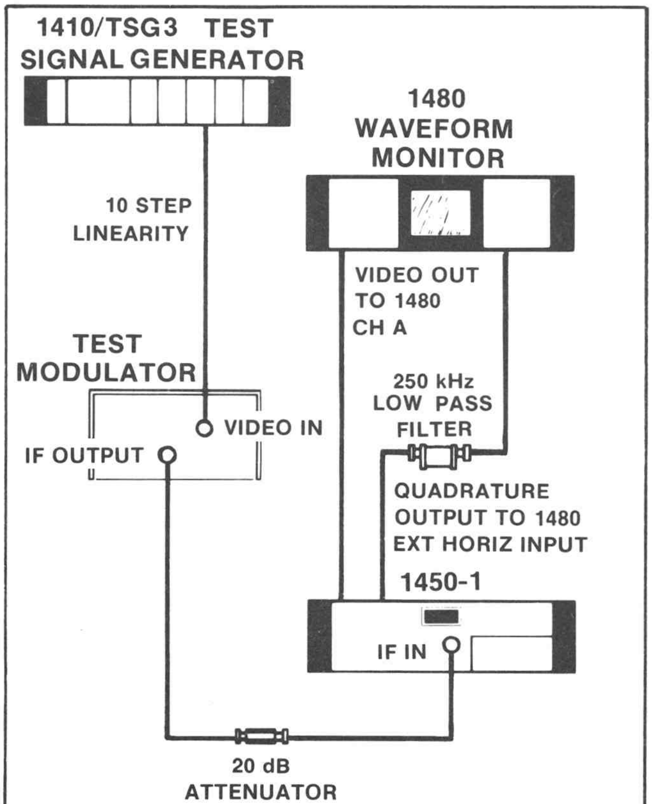
2200-92

Fig. 4-62. Effects of Adjusting L98 on A52.

27. Adjust Phase Sampler Balance (C01 on A52 Phase Shifter board)

a. Refer to Fig. 4-63. Connect the Linearity output from the 1410 to the Modulator Video In, and connect the Modulator IF Out to the 1450-1 IF IN.

b. Adjust C01 on A52 for no change of the test oscilloscope display as the SYNCHRONOUS TIME CONSTANT control is switched between FAST and SLOW time constants; and SYNC TIP and BACK PORCH DETECTION MODE buttons are switched.



1450-1

DETECTION MODE .... SYNCHRONOUS
SOUND TRAP .... IN
INTERNAL ZERO CARRIER REF .... ON
AGC .... MAN

TEST MODULATOR

VISUAL CARRIER .... ON

1480 WAVEFORM MONITOR

RESPONSE .... LOW PASS
INPUT .... A
VOLTS FULL SCALE 1.0
DISPLAY .... EXT

1410/TSG3 TEST SIGNAL GENERATOR

SET FOR 10 STEP LINEARITY TEST SIGNAL

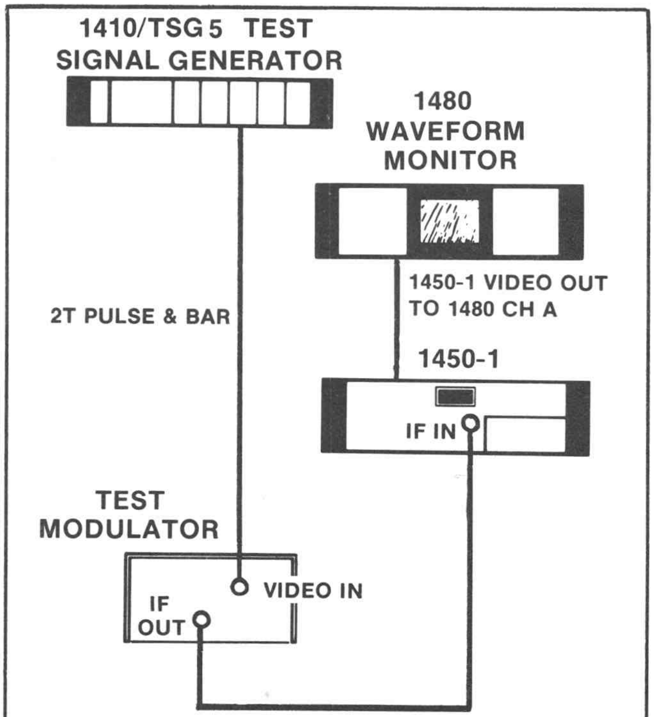
2200-93

Fig. 4-63. Equipment Setup to Adjust C01 on A52.

28. Adjust Quadrature Carrier Phase (C10 on A27 IF Zero Carrier/Phase Shifter board)

a. Connect the test equipment as shown in Fig. 4-64. Connect the 1410 Pulse and Bar output to the test modulator Video In. Push in the 1450-1 BACK PORCH (SYNCHRONOUS DETECTION MODE) button. Set the 1480 Horizontal Position control to display the 2T Pulse.

b. Adjust C10 for equal overshoot and undershoot of the 2T Pulse leading and trailing edges.



1450-1

SYNCHRONOUS DETECTION MODE
SOUND TRAP .... IN
AUTO AGC .... BACK PORCH

1410/TSG5 TEST SIGNAL GENERATOR

SET UP FOR 2T PULSE & BAR.

1480 WAVEFORM MONITOR

INPUT .... CH A DC CPL'D
VOLTS FULL SCALE 0.2
MAG .... OFF
DISPLAY .... 5 μs

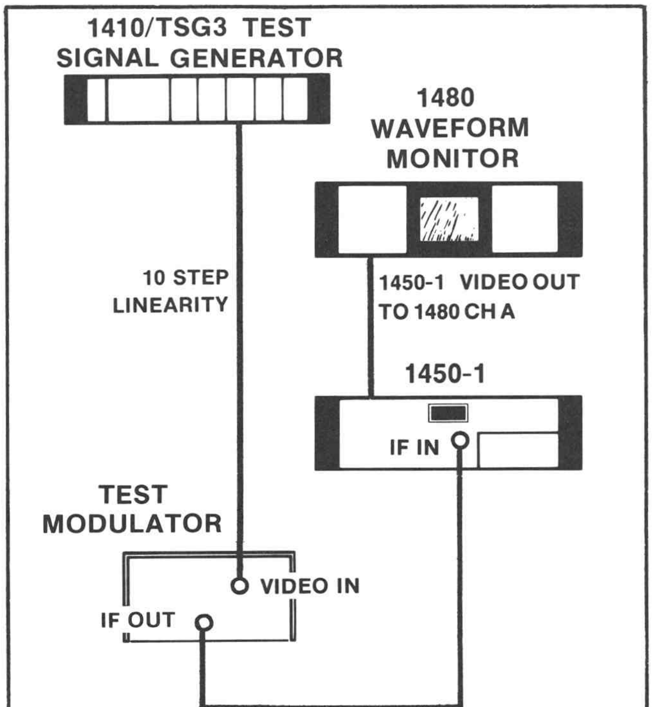
2200-94

Fig. 4-64. Equipment Setup for Adjusting C10 on A27.

29. Adjust Fine AGC (R47 on A60 AGC Control board)

a. Connect the test equipment as shown in Fig. 4-65.

b. Connect the 1450-1 VIDEO OUTPUT to the 1480 Waveform Monitor Ch A and set the 1480 Input switch to Ch A DC Cpl'd, Response in Flat, Volts Full Scale to 1.0, Display to 5 μs, and DC Restorer to Off.



1410/TSG3 TEST SIGNAL GENERATOR

SET FOR 10 STEP LINEARITY

1450-1

SYNCHRONOUS DETECTION MODE . BACK PORCH
SOUND TRAP .... IN
AUTO AGC .... BACK PORCH

TEST MODULATOR

VISUAL CARRIER .... ON

1480 WAVEFORM MONITOR

INPUT .... A DC CPL'D
RESPONSE .... FLAT
VOLTS FULL SCALE 1.0
DISPLAY .... 5 μs
DC RESTORER .... OFF

2200-95

Fig. 4-65. Equipment Setup to Adjust Fine AGC R47 on A61.

c. Adjust R47 (see Fig. 8-8 for R47 location) for minimum jumps of the blanking level on the 1480 display while rotating the GAIN control counterclockwise and clockwise.

30. Adjust Sync Tip Level (R17 on A60 AGC Control board)

a. Connect the test modulator IF Output to the 1450-1 IF IN. Check to see that nothing is connected to the test modulator Video In connector.

b. Push in the following buttons on the 1450-1 front panel:

SYNCHRONOUS DETECTION MODE	CONT
SOUND TRAP	IN
INTERNAL ZERO CARRIER	OFF
AUTO AGC	BACK PORCH

c. Connect the 1450-1 VIDEO OUT to a DM 502 set to measure millivolts. Note the DM 502 reading. Push in the SYNC TIP (AUTO AGC) button on the 1450-1 front level.

d. Adjust R17 (see Fig. 8-8 for R17 location) on A60 until the DM 502 indicates a dc level that is 2 x Sync Amplitude below the reading when the 1450-1 was in BACK PORCH AGC.

NOTE

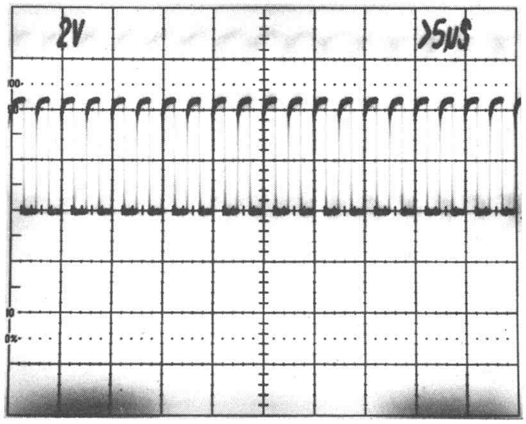
R17 is active only when the SYNC TIP AGC button is depressed.

31. Adjust A/D Cal (C94 on A61 Readout Driver board)

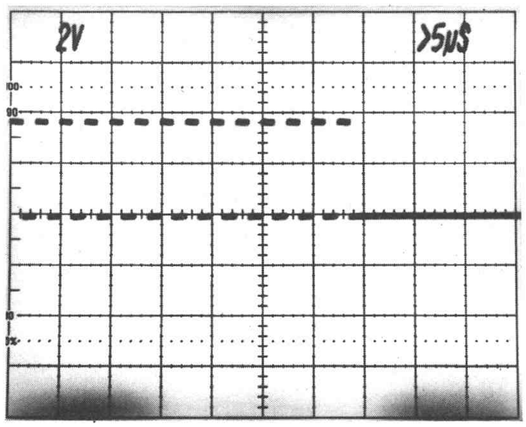
a. Monitor P67-2 (see Fig. 8-8 for P67 location) on A61 Readout Driver board with the test oscilloscope through a 10X probe. Set the test oscilloscope Time/Div to 5 μs, Trigger Slope to + (positive), and set the Variable Time/Div to display 2 Hz/div. Set the test oscilloscope for normal triggering (Norm Mode, AC Coupling, and Int Source). See Fig. 4-66 for a typical waveform.

b. Push in the MAN button on the 1450-1 and monitor TP67 on A61 Readout Driver board with the test oscilloscope. Slowly vary the GAIN control on the 1450-1 until the largest number of pulses are displayed on the test oscilloscope. Be sure that the MANual GAIN control is neither fully counterclockwise nor fully clockwise. Refer to Fig. 4-66 for a typical waveform.

@



(a) Waveform at P67-2 on A61.



(b) Waveform at TP67 on A61.

2200-96

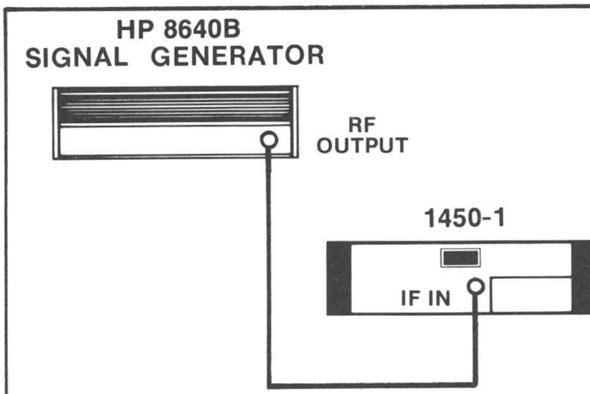
Fig. 4-66. Waveforms for Adjusting C94 on A61.

c. Adjust C94 for 14 pulses as displayed on the test oscilloscope; that is, 2 pulses per division for seven divisions. See Fig. 4-66.

32. Adjust IF Atten/Amp Gain (R51 on A21)

a. Connect the test equipment as shown in Fig. 4-67. Remove A20 from the 1450-1 IF strip, and connect the HP 435A Power Sensor through a BNC-to-Square Pin Adapter cable to the input pins (pin 2 labeled IN/pin 1 = Ground) in A20 location. Set the HP 8640B Output Level control for a −20 dBm reading on the HP 435A. Disconnect the HP 435A from A20 location, and replace A20.

b. Remove A24 from 1450-1 IF strip, and monitor the input pins (pin 11 labeled IN Narrow/pin 12 = Ground) to A24 location with the HP 435A using a BNC-to-Square Pin Adapter cable.



HP 8640B SIGNAL GENERATOR

FREQUENCY.................... 1450-1 IF 2 MHz

1450-1

SYNCHRONOUS DETECTION MODE .... CONT
SOUND TRAP .... OUT
INTERNAL ZERO CARRIER REF .... OFF
AUTO AGC .... BACK PORCH

2200-97A

Fig. 4-67. Power Levels Adjustment Test Setup.

c. Push in (SOUND TRAP) IN, and MAN (AGC) buttons on the 1450-1 front panel. Set the 1450-1 MAN GAIN control fully counterclockwise.

d. Adjust R51 on A21 for −20 dBm reading on the HP 435A (0 dB gain from IF input to A24 input).

e. Replace A24 in the 1450-1 IF strip.

33. Adjust Narrow IF SAW Amp Gain (R93 on A24)

a. Omit step 33 part a if proceeding from step 32. Connect the test equipment as shown in Fig. 4-67. Remove A20 from the 1450-1 IF strip, and connect the HP 435A Power Sensor through a BNC-to-Square Pin Adapter cable to the input pins (pin 2 labeled IN/pin 1 = Ground) in A20 location. Set the HP 8640B Output Level control for a −20 dBm reading on the HP 435A. Disconnect the HP 435A from A20 location, and replace A20.

b. Remove A26 from the 1450-1 IF strip, and monitor the input pins (pin 4 labeled IN Narrow/pin 3 = Ground) to A26 location with the HP 435A using a BNC-to-Square Pin Adapter cable.

c. Push in (SOUND TRAP) IN and MAN (AGC) buttons on the 1450-1 front panel. Set the 1450-1 MAN GAIN control fully counterclockwise.

d. Adjust R93 on A24 for −20 dBm reading on the HP 435A (0 dB gain from IF input to A26 location input).

e. Replace A26 in the 1450-1 IF strip.

34. Adjust IF Post Amp Gain (R41 on A26 IF Post Amp board)

a. Omit step 34 part a if proceeding from step 33. Connect the test equipment as shown in Fig. 4-67. Remove A20 from the 1450-1 IF strip, and connect the HP 435A Power Sensor through a BNC-to-Square Pin Adapter cable to the input pins (pin 2 labeled IN/pin 1 = Ground) in A20 location. Set the HP 8640B Output Level control for a −20 dBm reading on the HP 435A. Disconnect the HP 435A from A20 location, and replace A20.

b. Remove A27 from the 1450-1 IF strip, and monitor the input pins (pin 12 labeled IN/pin 11 = Ground) to A27 location with the HP 435A using a BNC-to-Square Pin Adapter cable.

c. Push in (SOUND TRAP) IN and MAN (AGC) buttons on the 1450-1 front panel. Set the 1450-1 MAN GAIN control fully counterclockwise, then slowly vary the MAN GAIN control clockwise until the power level on the HP 435A abruptly drops down to the lowest level.

d. Adjust R41 on A26 for +7 dBm reading on the HP 435A (+27 dB gain from IF input to A27 location input).

e. Replace A27 in the 1450-1 IF strip.

35. Adjust Wide IF SAW Amp Gain (R93 on A25 IF Saw Amp board)

a. Omit Step 35 part a if proceeding from step 34. Connect the test equipment as shown in Fig. 4-67. Remove A20 from the 1450-1 IF strip, and connect the HP 435A Power Sensor through a BNC-to-Square Pin Adapter cable to the input pins (pin 2 labeled IN/pin 1 = Ground) in A20 location. Set the HP 8640B Output Level control for a −20 dBm reading on the HP 435A. Disconnect the HP 435A from A20 location, and replace A20.

b. Remove A27 from the 1450-1 IF strip, and monitor the input pins (pin 12 labeled IN/pin 11 = Ground) to A27 location with the HP 435A using a BNC-to-Square Pin Adapter cable.

c. Push in (SOUND TRAP) OUT, and MAN (AGC) buttons on the 1450-1 front panel. Set the 1450-1 MAN GAIN control fully counterclockwise, then vary the MAN GAIN control clockwise until the power level on the HP 435A suddenly drops to a lower level.

d. Adjust R93 on A25 for +7 dBm reading on the HP 435A (+27 dB gain from IF input to A27 input).

e. Replace A27 in the 1450-1 IF strip.

36. Readjust IF Mixer Filter (L33, L36, and C48 or L43, L36, and C45 on A22 IF Mixer board)

a. Connect the 1410/TSG6 Field Sweep output to the test modulator Video In. Set the test modulator aural carrier off, and the visual carrier on. Set the TSG6 front panel as follows:

Freq Range	Low
Markers	Off
Composite/Continuous	Cont
Ampl	Full
Sweep	On

b. Connect the test modulator IF Out to the 1450-1 IF IN. Push in the CONT (SYNCHRONOUS DETECTION MODE), SOUND TRAP IN, and BACK PORCH (AGC) buttons.

c. Monitor the 1450-1 VIDEO OUTPUT with a 1480 Waveform Monitor, and set the 1480 front panel as follows:

Response	Flat
Input	A or B depending on rear panel connection
Volts Full Scale	0.2
Mag	Off
Display	2 Field

Use the 1480 position controls to bring the top of the field sweep display within the viewing area, and check for flatness after verifying the flatness of the TSG6.

d. Adjust L33, L36, and C48 or L43, L36, and C45 for a flat 2 Field display. In most cases it is sufficient to adjust L36 only to achieve a flat display.

37. Adjust Overdrive (R01 on A21) (R01 on A21 IF Attenuator Amp board)

NOTE

This step applies to all instruments below serial number B010214. Disregard this step for all instruments with higher serial numbers.

a. Switch on the sound carrier in the modulator, and adjust the aural carrier level such that sound and vision carrier amplitudes are the same at the 1450-1 IF input. Levels may be set using the 7L13.

b. Refer to Fig. 4-68. Connect the test modulator IF Out to the 1450-1 IF IN through a 6 dB pad. Push in (SOUND TRAP) IN and MAN (AGC) buttons on the 1450-1 front panel. Set the 1450-1 MANual GAIN for a normal video signal (Readout High/Low lights off).

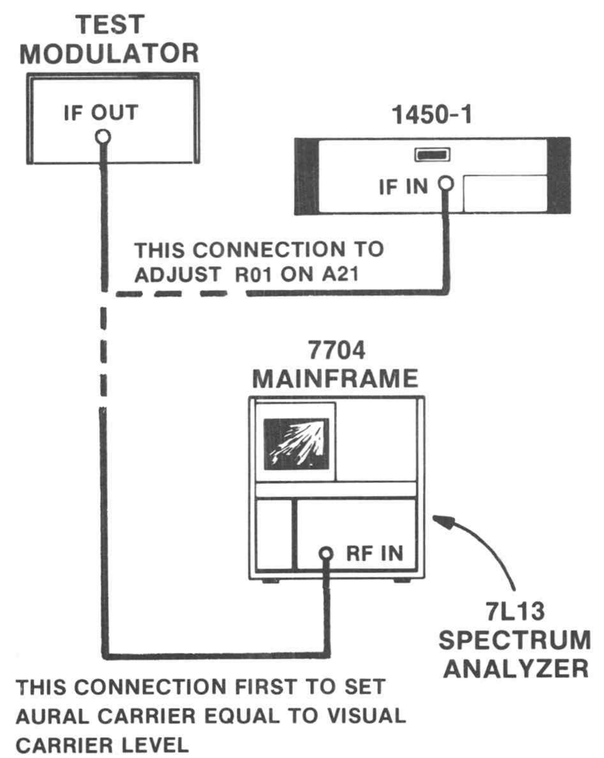
c. Remove the 6 dB pad, and monitor P19-1 on A32 (IF Interface board) with the test oscilloscope. The test oscilloscope must be dc coupled.

d. Adjust R01 on A21 until a positive jump in dc level occurs at P19-1 on A32 (about 250 mV).

38. Adjust 28.5 MHz and Aural Alarm Bandpass Filters (L62, L66, and L92 on A40 1st Audio Mixer board)

a. Connect the test equipment as shown in Fig. 4-69. Set the aural carrier Level control on the test modulator such that the aural level is 10 dB smaller than the visual carrier level as viewed on the spectrum analyzer. Now reset the spectrum analyzer Hz Resolution to 3 kHz, and the Freq Span/Div to 10 kHz. Set the Var attenuator on the SG 502 for minimum 10.395 kHz at the center frequency. This sets the modulation to 25 kHz peak. See Fig. 4-70.

b. Connect the test modulator IF Out to the 1450-1 IF IN connector, and connect the 1450-1 INTERCARRIER OUT to the frequency counter. Set the test modulator Center Frequency such that the counter indicates 4.5 MHz.



TEST MODULATOR

AURAL CARRIER	ON
VISUAL CARRIER	ON

1450-1

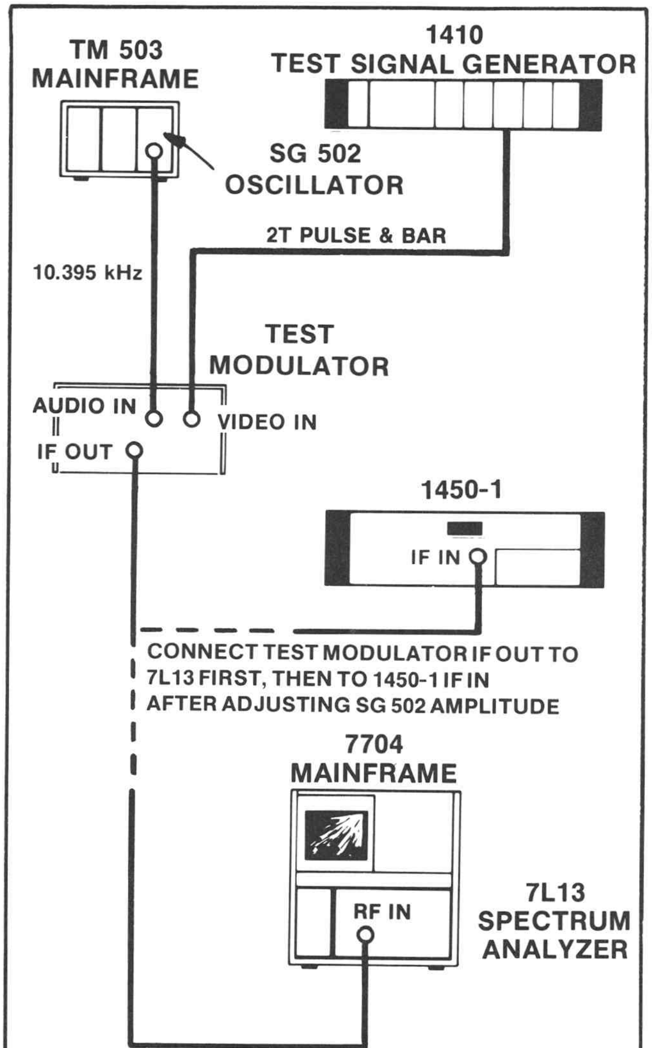
DETECTION MODE	CONT (SYNCHRONOUS)
SOUND TRAP	IN
AUTO AGC	BACK PORCH

7L13 SPECTRUM ANALYZER

CENTER FREQUENCY	IF FREQUENCY
REFERENCE LEVEL	−20 dBm
VERTICAL MODE	10 dB/DIV
FREQ SPAN/DIV	5 MHz
RESOLUTION	300 kHz

2200-98

Fig. 4-68. Equipment Setup to Adjust R01 on A21.



TEST MODULATOR

AURAL CARRIER	ON
VISUAL CARRIER	ON
AURAL CARRIER LEVEL	SET 10 dB BELOW VISUAL CARRIER LEVEL

7L13 SPECTRUM ANALYZER

CENTER FREQUENCY	(IF −4.5 MHz)
SPAN/DIV	2 MHz
RESOLUTION	300 kHz
TIME/DIV	20 ms
VERT MODE	10 dB/DIV
REFERENCE LEVEL	−20 dBm

1450-1

SYNCHRONOUS DETECTION MODE	BACK PORCH
SOUND TRAP	IN
AGC	MANUAL GAIN

2200-99

Fig. 4-69. Equipment Setup to Adjust 28.5 MHz and Aural Alarm Bandpass Filters (L62, L66, and L92 on A40).

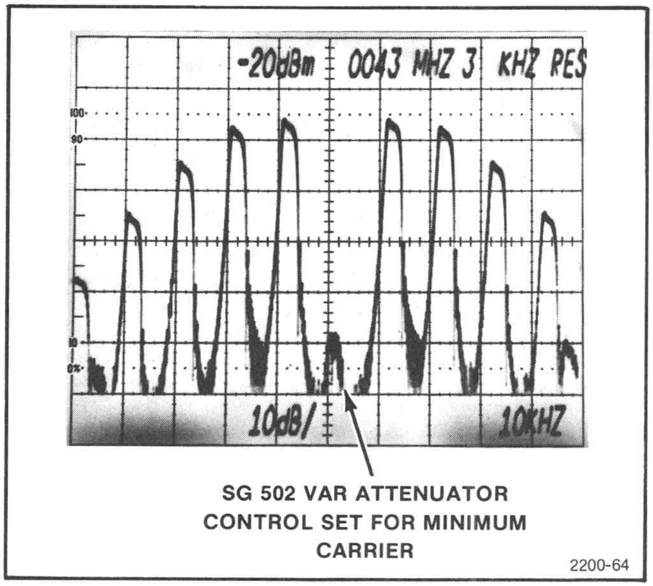


Fig. 4-70. Waveform for Setting 25 kHz Peak Deviation.

c. Monitor the INTERCARRIER OUTput with the test oscillsocope. Push in SPLIT, and BACK PORCH (AGC) buttons on the 1450-1 front panel.

d. Adjust L62 and L66 on A40 for maximum INTER-CARRIER OUT signal on the test oscilloscope.

e. Monitor pin 12 on the Extender board with the test oscilloscope in dc mode. Decrease aural carrier level on the test modulator until the AURAL CARRIER LOSS light on the 1450-1 comes on, then slowly turn the test modulator Aural Carrier Level control clockwise until the 1450-1 AURAL CARRIER LOSS light goes out.

f. Adjust L92 on A40 for maximum dc level at pin 12 of the Extender board.

39. Adjust 4.5 MHz Input and Output Bandpass Filters (T17 and T31 on A41 2nd Audio Mixer board)

a. Omit parts a and b of this step if proceeding from step 38. Connect the test equipment as shown in Fig. 4-69. Set the aural carrier level control on the test modulator such that the aural carrier level is 10 dB smaller than the visual carrier level as viewed on the spectrum analyzer. Now reset the spectrum analyzer Hz Resolution to 3 kHz, and the Freq Span/Div to 10 kHz. Set the Var Attenuator on the SG 502 for minimum 10.395 kHz at the center frequency. This sets the modulation to 25 kHz peak. See Fig. 4-70.

b. Connect the test modulator IF Out to the 1450-1 IF IN connector, and connect the 1450-1 INTERCARRIER OUT to the frequency counter. Set the test modulator Center Frequency such that the counter indicates 4.5 MHz.

c. Monitor the INTERCARRIER OUTput with the test oscilloscope. Push in SPLIT, and BACK PORCH (AGC) buttons on the 1450-1 front panel. Set the test modulator aural carrier level control for approximately 300 mV INTERCARRIER OUT signal on the test oscilloscope.

d. Adjust T17 and T31 on A41 for maximum INTERCARRIER OUT signal on the test oscilloscope.

40. Adjust Output Amp Bias (2) (R56 and R53 on A44 Audio Interface board)

a. Remove A43 from the 1450-1, and connect an SG 502 to pin 12 (pin 11 = Ground) in A43 location on A44 using a BNC-to-Square Pin Adapter cable.

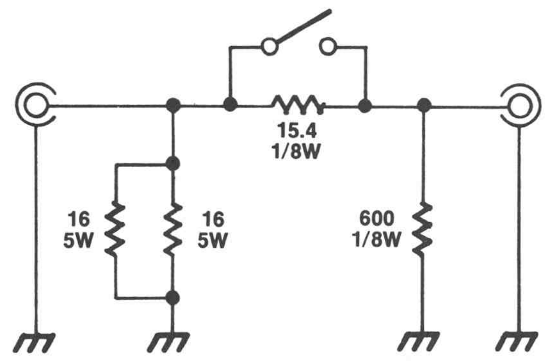
b. Monitor TP06 on A44 Audio Interface board with the test oscilloscope. Set the SG 502 Var Attenuator for 2.5 V P-P signal at TP06.

c. Monitor J12 (8 Ω Output) with the 5L4N Spectrum Analyzer using the 8 Ω-to-600 Ω pad shown in Fig. 4-71 (30 dB pad switched in). Set the 5L4N as follows:

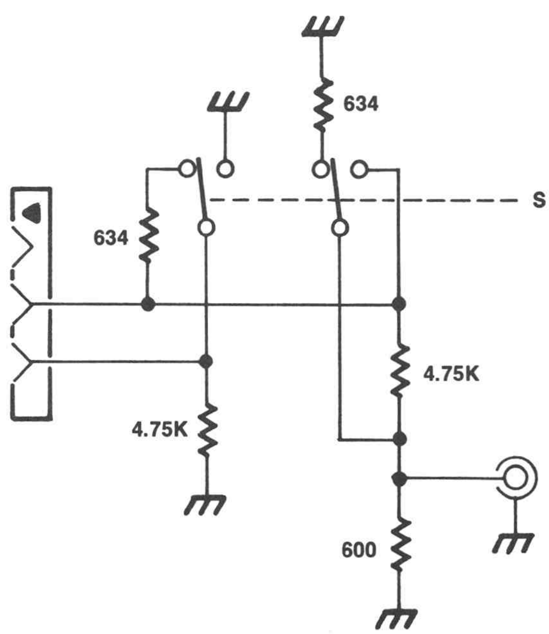
Frequency	25 kHz
Span/Div (Hz)	5 K
s/div	10 ms
Log Ref	−10
Mode	10 dB/div
Ext Termination	600 Ω
Auto Trig	In

Set the 1450-1 AUDIO LEVEL control for a +20 dBm (−10 dBm on analyzer) level at the 8 Ω SPEAKER output. Now change the Log Ref on the 5L4N to −20 dB.

d. Adjust R56 (labeled Bias) on A44 for minimum 3rd harmonic on the 5L4N. See Fig. 4-72. Note that in instruments from B000100 to B000119, this is R49; and in instruments from B010120 to B010187, this is R59. Note that this adjustment may have very little effect on the 3rd harmonic. Harmonics should be down at least 70 dB from the fundamental.



(a) 8 Ω to 600 Ω matching pad with switchable 30 dB attenuator.

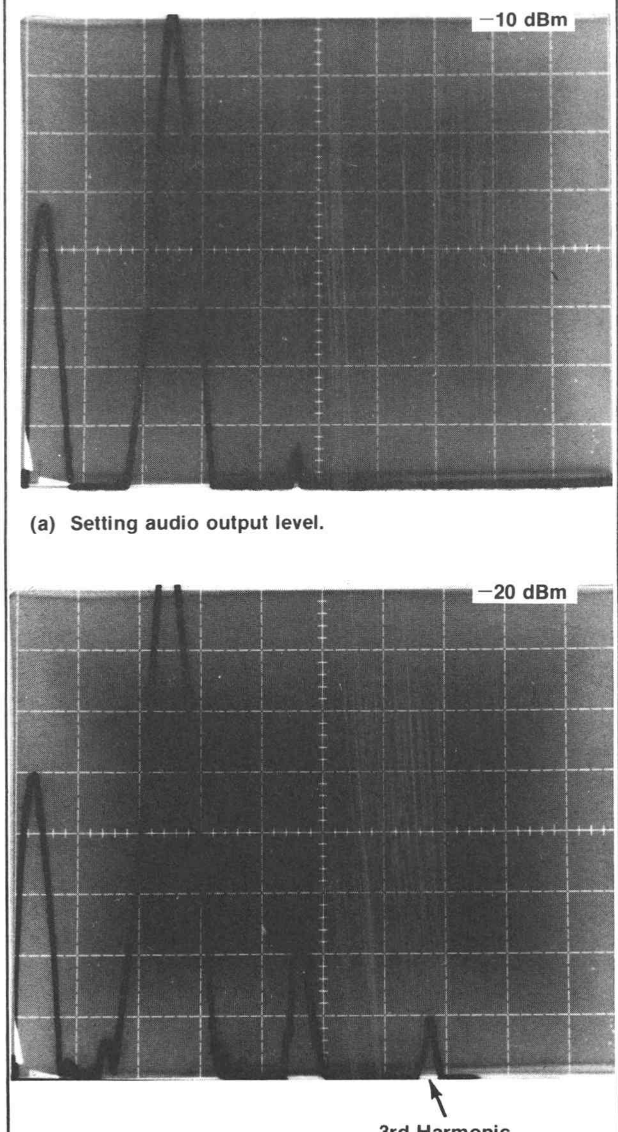


(b) 600 Ω Balanced Line Audio Output Calibration Fixture with switchable 30 dB attenuator.

2200-100

Fig. 4-71. Audio Calibration Fixtures.

e. Monitor J13 (600 Ω Balanced Line Output) with the 5L4N Spectrum Analyzer using the 600 Ω pad shown in Fig. 4-71. Set the 5L4N Log Ref at −10, and set the 1450-1 600 Ω audio gain (labeled GAIN, R05/R14 depending on the serial number of the 1450-1) for a 10 dBm level (−20 dBm on analyzer) at the 600 Ω BALANCED LINE AUDIO OUTPUT. Now change the 5L4N Log Ref to −20.



(a) Setting audio output level.

(b) Adjustment waveform.

2200-101

Fig. 4-72. Waveforms for Adjusting R56 and R53 on A44.

f. Adjust R53 (labeled Bias) on A44 for minimum 3rd harmonic on the 5L4N. See Fig. 4-72. Note that in instruments from B000100 to B010187 this is R43.

g. Replace A43 in the 1450-1.

41. Adjust DEVIATION OUT and Aural Mode Center Frequency (R76 and R30 on A43 Audio Discriminator board)

a. Connect the test equipment as shown in Fig. 4-69. Set the aural carrier level control on the text modulator such that the aural carrier level is 10 dB smaller than the visual carrier level as viewed on the spectrum analyzer. Now reset the spectrum analyzer Hz Resolution to 3 kHz, and the Freq Span/Div to 10 kHz. Set the Var attenuator on the SG 502 for minimum 10.395 kHz at the center frequency. This sets the modulation to 25 kHz peak. See Fig. 4-70.

b. Connect the test modulator IF Out to the 1450-1 IF IN connector, and connect the 1450-1 INTERCARRIER OUT to the frequency counter. Set the test modulator Center Frequency such that the counter indicates 4.5 MHz.

c. Monitor the DEVIATION OUTput on the 1450-1 with the DM 502. Set the DM 502 at 2 Vac.

d. Adjust R76 on A43 for 0.884 V DEVIATION OUTput level. This is 2.5 V P-P when measured with an oscilloscope.

e. Monitor TP51 on A53 (Converter Phase Lock board) with the test oscilloscope. Push in AURAL ONLY and SPLIT buttons on the 1450-1 front panel.

f. Adjust R30 on A43 for the lowest frequency sine wave at TP51 on A53. Ideal condition is no periodic signal at TP51 (dc). However, any signal less than 1 kHz is acceptable.

42. Adjust 1 MHz Bandpass Filter (L45, L55, L75, and L95 on A42 Audio Limiter board)

a. Omit parts a and b of this step if proceeding from step 42. Connect the test equipment as shown in Fig. 4-69. Set the aural carrier level control on the test modulator such that the aural carrier level is 10 dB smaller than the visual carrier level as viewed on the spectrum analyzer. Now reset the spectrum analyzer Hz Resolution to 3 kHz, and the Freq Span/Div to 10 kHz. Set the Var attenuator on the SG 502 for minimum 10.395 kHz at the center frequency. This sets the modulation to 25 kHz peak. See Fig. 4-70.

b. Connect the test modulator IF Out to the 1450-1 IF IN connector, and connect the 1450-1 INTERCARRIER OUT to the frequency counter. Set the test modulator Center Frequency such that the counter indicates 4.5 MHz.

c. Monitor J13 (600 Ω Balanced Line) with the 5L4N using the 30 dB pad shown in Fig. 4-71. Set the 5L4N as follows:

Frequency	25 kHz
Span/Div (Hz)	5 K
s/div	10 ms
Log Ref	−20
Mode	10 dB/div
Ext Termination	600 Ω
Auto Trig	In

d. Adjust L45, L55, L75, and L95 for minimum third harmonics. See Fig. 4-72 for comparative waveforms.

43. Adjust 600 Ω Balance Line Output Level (R05 on A44 Audio Interface board)

a. Omit parts a and b of this step if proceeding from step 41. Connect the test equipment as shown in Fig. 4-69. Set the aural carrier level control on the test modulator such that the aural carrier level is 10 dB smaller than the visual carrier level as viewed on the spectrum analyzer. Now reset the spectrum analyzer Hz Resolution to 3 kHz, and the Freq Span/Div to 10 kHz. Set the Var Attenuator on the SG 502 for minimum 10.395 kHz at the center frequency. This sets the modulation to 25 kHz peak. See Fig. 4-70.

b. Connect the test modulator IF Out to the 1450-1 IF IN connector, and connect the 1450-1 INTERCARRIER OUT to the frequency counter. Set the test modulator Center Frequency such that the counter indicates 4.5 MHz.

c. Monitor J13 with the DM 502 using the test fixture shown in Fig. 4-71. Switch out the 30 dB pad in the test fixture, and set the DM 502 at 20 Vac. Push in SPLIT (AUDIO SOURCE) and BACK PORCH (AGC) buttons on the 1450-1 front panel.

d. Adjust R05 for a 2.45 V (+10 dBm output level with the 1450-1 MANual GAIN control fully clockwise.

e. Disconnect all test equipment from the 1450-1.

44. Adjust Temperature Tracking Gain Range (R60 on A50 Ref Control Board)

a. Install the shield-cavity (extrusion) covers except over A50. Place the 1450-1 in an environment that is at least 20 degrees above room temperature. Apply power to the 1450-1 and let sit running for about 30 minutes.

NOTE

If the 1450-1 must be removed from an elevated temperature environment, this adjustment must be performed within 1 minute of removing the unit from an elevated temperature environment.

b. Drive the 1450-1 with a field sweep signal through a test modulator. See Fig. 4-56.

c. Adjust R60 on A50 for flatness of the waveform displayed on the waveform monitor. See Fig. 4-57a.

MAINTENANCE

Introduction

This section describes the procedure for reducing or preventing instrument malfunctions, plus troubleshooting, and corrective maintenance. Preventive maintenance improves instrument reliability. Should the instrument fail to function properly, corrective measures should be taken immediately; otherwise, additional problems may develop within the instrument.

PREVENTIVE MAINTENANCE

Preventive maintenance consists of cleaning, visual inspection, performance check, and if needed, readjustment. The preventive maintenance schedule that is established for the instrument should be based on the environment in which the instrument is operated and the amount of use. Under average conditions a preventive maintenance check should be performed every 3000 hours of instrument operation.

Cleaning

Clean the instrument often enough to prevent dust or dirt from accumulating in or on it. Dirt acts as a thermal insulating blanket and prevents efficient heat dissipation. It also provides high-resistance electrical leakage paths between conductors or components in a humid environment.

Exterior. Clean the dust from the outside of the instrument by wiping or brushing the surface with a soft cloth or small brush. The brush will remove dust from around the front-panel controls and connectors. Hardened dirt may be removed with a cloth dampened in water that contains a mild detergent. Abrasive cleaners should not be used.

Interior. Clean the interior by loosening accumulated dust with a dry soft brush, then remove the loosened dirt with low-pressure air to blow the dust clear. (High-velocity air can damage some components.) Hardened dirt or grease may be removed with a cotton tipped applicator dampened with a solution of mild detergent in water. Abrasive cleaners should not be used. If the circuit-board assemblies need cleaning, remove the circuit board by referring to the instructions under Corrective Maintenance in this section.

After cleaning, allow the interior to thoroughly dry before applying power to the instrument.

CAUTION

Do not allow water to get inside any enclosed assembly or components. Do not clean any plastic materials with organic cleaning solvents such as benzene, toluene, xylene, acetone, or similar compounds because they may damage the plastics.

Visual Inspection

After cleaning, carefully check the instrument for such defects as defective connections, damaged parts, and improperly-seated transistors and integrated circuits. The remedy for most visible defects is obvious; however, if heat-damaged parts are discovered, try to determine the cause of overheating before the damaged part is replaced; otherwise, the damage may be repeated.

Transistor and Integrated Circuit Checks

Periodic checks of the transistors and integrated circuits are not recommended. The best measure of performance is the actual operation of the component in the circuit. Performance of these components is thoroughly checked during the performance check or adjustment procedures, and any substandard transistors or integrated circuits will usually be detected at that time.

Static-Sensitive Components

CAUTION

Static discharge can damage any semiconductor component in this instrument.

This instrument contains electrical components that are susceptible to damage from static discharge. See Table 5-1 for relative susceptibility of various classes of semiconductors. Static voltages of 1 kV to 30 kV are common in unprotected environments.

Observe the following precautions to avoid damage:

1. Minimize handling of static-sensitive components.

2. Transport and store static-sensitive components or assemblies in their original containers, on a metal rail, or on conductive foam. Label any package that contains static-sensitive assemblies or components.

3. Discharge the static voltage from your body by wearing a wrist strap while handling these components. Servicing static-sensitive assemblies or components should be performed only at a static-free work station by qualified personnel.

4. Nothing capable of generating or holding a static charge should be allowed on the work station surface.

5. Keep the component leads shorted together whenever possible.

6. Pick up components by the body, never by the leads.

7. Do not slide the components over any surface.

8. Avoid handling components in areas that have a floor or work-surface covering capable of generating a static charge.

9. Use a soldering iron that is connected to earth ground.

10. Use only special antistatic suction-type or wick-type desoldering tools.

Table 5-1

RELATIVE SUSCEPTIBILITY TO STATIC DISCHARGE DAMAGE

Semiconductor Classes	Relative Susceptibility Levels[a]
MOS or CMOS microcircuits or discretes, or linear microcircuits with MOS inputs (Most Sensitive)	1
ECL	2
Schottky signal diodes	3
Schottky TTL	4
High-frequency bipolar transistors	5
JFETS	6
Linear Microcircuits	7
Low-power Schottky TTL	8
TTL (Least Sensitive)	9

[a]Voltage equivalent for levels:

1 = 100 to 500 V 4 = 500 V 7 = 400 to 1000 V (est.)
2 = 200 to 500 V 5 = 400 to 600 V 8 = 900 V
3 = 250 V 6 = 600 to 800 V 9 = 1200 V

(Voltage discharged from a 100 pF capacitor through a resistance of 100 ohms.)

Performance Checks and Readjustment

The instrument performance should be checked after each 3000 hours of operation, or every six months if the instrument is used intermittently, to ensure maximum performance and assist in locating defects that may not be apparent during regular operation. Instructions for conducting a performance check are provided in the Calibration section.

TROUBLESHOOTING

The following are a few aids and suggestions that may assist in locating a problem. After the defective assembly or component has been located, refer to the Corrective Maintenance part of this section for removal and replacement instructions.

NOTE

No repair should be attempted during the warranty period or by unqualified personnel.

Troubleshooting Aids

Foldout Pages. The foldout pages at the back of the manual contain significant information useful for troubleshooting the instrument. Block and schematic diagrams, waveforms, circuit board illustrations, parts locating charts, and integrated circuit (ic) diagrams are located on foldout pages. See Fig. 5-1.

Diagrams. Block and circuit diagrams are the most often used aids to troubleshooting. The circuit number and electrical value of each component is shown on the diagrams (see the first page in the Diagrams section for definition of the reference symbology used to identify components in each circuit). Refer to the Replaceable Electrical Parts list for a complete description of each component. Those portions of the circuit that are mounted on circuit boards or assemblies are enclosed in a gray border, with the name and assembly number shown on the border.

NOTE

Check the Change Information section at the rear of the manual for inserts describing corrections and modifications to the instrument and manual.

Circuit Board Illustrations. Electrical components, connectors, and test points are identified on circuit board illustrations located on the inside fold of the corresponding circuit diagram, or the back of the preceding diagram.

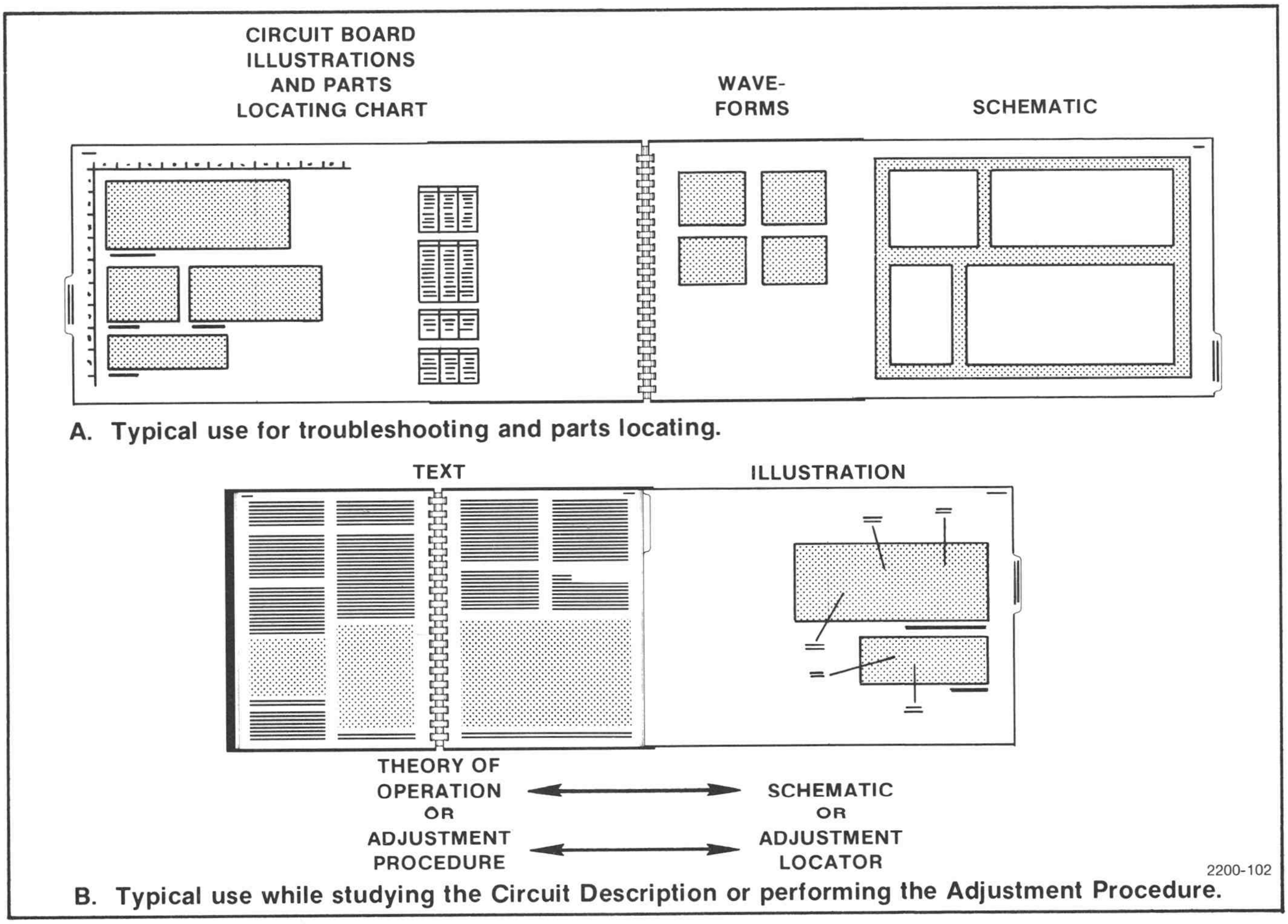


Fig. 5-1. Using the Foldout Pages.

Parts Locating Charts. The schematic diagrams and the circuit board illustrations are assigned location grids. A parts locating chart for each assembly gives grid locations of components on both the circuit board and the schematic.

Assembly and Circuit Numbering. The circuit boards and other assemblies (except for the chassis and the front and rear panel components) are assigned assembly numbers that generally follow the signal path through the instrument. See Fig. 5-2.

Each component is assigned a circuit number according to its geographic location within an assembly.

The Replaceable Electrical Parts list is arranged in assembly by assembly order, as designated by ANSI Standard Y32.16-1975. The circuit number in the parts list is made up by combining the assembly number and the circuit number.

EXAMPLE: R25 on A61 would be listed in the parts list as A61R25.

In the case of chassis, and front- and rear-panel mounted parts which have no assembly number, the parts list number is the same as shown on the schematic. Any one- or two-digit circuit number in the parts list is a part mounted on the front or rear panel, or the chassis.

NOTE

The parts list number should be used when ordering replacement parts.

Components. Wire Color Codes. Insulated wires are color-coded to facilitate circuit tracing. Table 5-2 summarizes the coding system used in this instrument.

Table 5-2

WIRE COLOR CODES

Color Code	Significance
Black	Chassis Ground
White on Black	Floating Ground
Yellow on Green	Safety Ground
Gray[a]	AC Line
White[a]	Signal
Red[b]	+Vcc
Violet[b]	−Vcc

[a]Color stripes are used on these wires as an aid to circuit tracing.

[b]Color strip on wire indicates position of supply with respect to 0 volt (e.g., a black stripe on a red wire would be the first voltage in the positive direction). If a second stripe is used (white only), this indicates a non-regulated supply.

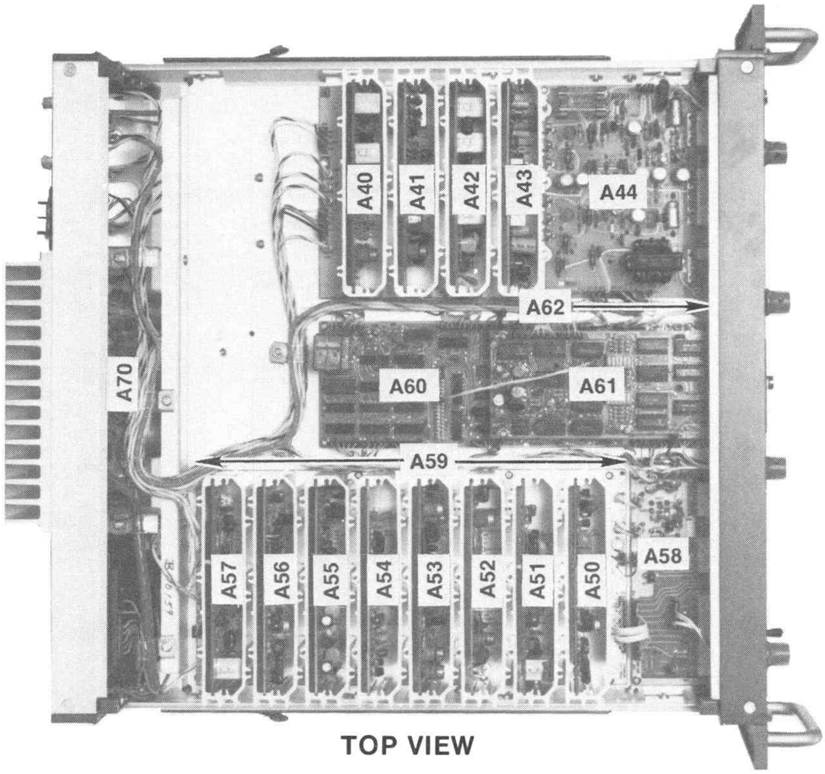
Connectors. Intercircuit connections are made by various connector types. Pin connectors are used for board-to-board connections on a common interface board. Multiple terminal connectors in harmonica-type plastic holders are used for wire cable interconnection of boards. The terminals in the holder are identified by numbers that appear on the holder and the circuit diagrams. Connector orientation to the circuit board is keyed by triangles on the holder and the circuit board (see Fig. 5-3). Coaxial connectors for board-to-board and board-to-panel mounted bnc connectors are the Peltola type.

NOTE

When reconnecting a Peltola connector, be careful to avoid bending the coaxial center conductor.

All connectors are identified on the schematic and board with "P" numbers.

Resistors. Composition (brown body), metal-film (gray or light blue body), power, and chip resistors are used in this instrument. The resistance values of composition and metal film resistors are color coded on the component with EIA color code (some metal film resistors may have the value printed on the body). Chip resistors are generally too small to be marked, and therefore should be handled cautiously to avoid mixing resistors of different values if replacing more than one.



A40 First Audio Mixer Board
A41 Second Audio Mixer Board
A42 Audio Limiter Board
A43 Audio Discriminator Board
A44 Audio Interface Board
A50 Reference Control Board
A51 Reference Oscillator Board
A52 Phase Shifter Board
A53 Converter Phase Lock Board
A54 Detector-LO Switch Board
A55 Limiter Board
A56 Converter Control Board
A57 Converter Oscillator Board
A58 Phase Lock Switch Board
A59 Phase Lock Interface Board
A60 AGC Control Board
A61 Readout Driver Board
A62 Readout Board
A70 Power Supply

A1 RF Attenuator
A20 IF Filter-Amplifier Board
A21 IF Attenuator-Amplifier Board
A22 IF Attenuator-Mixer-Filter Board
A23 IF Switch-Aural Drive Board
A24 IF SAW Amplifier (Narrow Band) Board
A25 IF SAW Amplifier (Wide Band) Board
A26 IF Post Amplifier Board
A27 IF Zero Carrier-Phase Shifter Board
A28 IF Detector-Video Amplifier (Quadrature) Board
A29 IF Detector-Video Amplifier (Video) Board
A30 PIN Driver Board (drives A21)
A31 PIN Driver Board (drives A22)
A32 IF Interface Board
A70 Power Supply

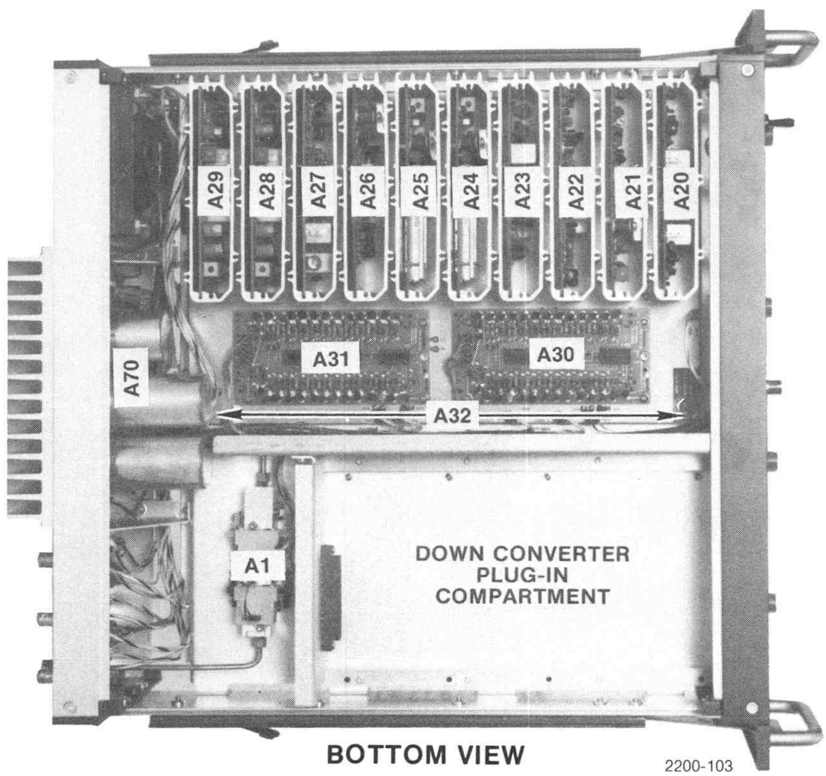


Fig. 5-2. Assembly Locations.

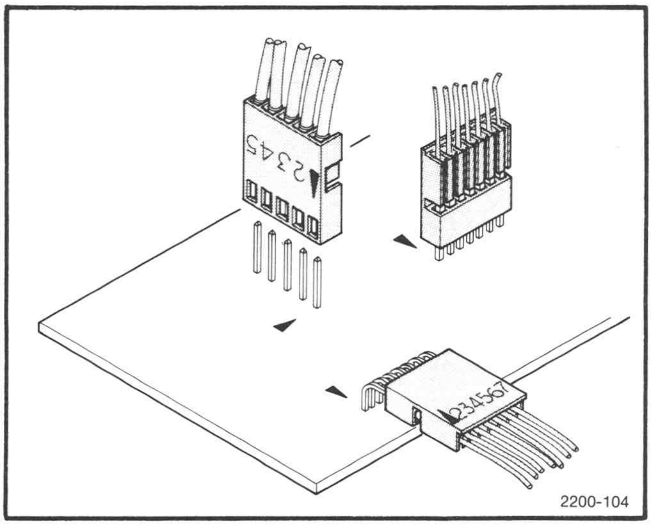


Fig. 5-3. Multipin Intercircuit Connectors.

Capacitors. The capacitance value of common disc capacitors or small electrolytics are marked in microfarads or picofarads on the side of the component body. The white ceramic capacitors and tantalum electrolytics are color coded. Chip capacitors are generally too small to be marked, and so again, care should be taken against mixing more than one value of chip component at a time.

Diodes. The cathode of each glass encased diode is indicated by a stripe, a series of stripes, or a dot. Some diodes have a diode symbol printed on one side.

Most diodes can be checked in the circuit by taking measurements across the diode and comparing these with voltages listed on the diagram. Forward-to-back resistance ratios can usually be taken by referring to the schematic and pulling appropriate transistors and pin connectors to remove low-resistance loops around the diode.

CAUTION

Do not use an ohmmeter scale with a high external current to check the diode junction.

Transistors. Lead identification for the transistors and ic is shown in Fig. 5-4.

Semiconductor failures account for the majority of electronic equipment failures. Substitution is often the most practical means for checking their performance. The following guidelines should be followed when substituting these components:

1. First determine that circuit voltages are safe for the substituted component, so the replacement will not be damaged.

2. Use only good components for substitution.

3. Turn the power off before a component is substituted.

4. Be sure the component is inserted properly in its socket (see Fig. 5-4 or the manufacturer's data sheet).

5. After the operational check, return the good components to their original sockets to reduce calibration time and burn-in period.

NOTE

When replacing transistors mounted with heat sinks, check that they have adequate heat conducting grease (Tektronix Part No. 006-0625-00) for proper thermal conduction.

WARNING

Handle thermal conducting grease with care. Avoid getting the grease in eyes. Wash hands thoroughly after use.

NOTE

If a substitute is not available, check the transistor with a dynamic tester such as the TEKTRONIX Type 577 Curve Tracer. Static type testers, such as an ohmmeter, can be used to check the resistance ratio across some semiconductor junctions if no other method is available. Use the high resistance ranges (R X 1k or higher) so the external test current is limited to less than 6 mA. If uncertain, measure the external test current with an ammeter. Resistance ratios across base-to-emitter or base-to-collector junctions usually run 100:1 or higher. The ratio is measured by connecting the meter leads across the terminals, noting the reading, then reversing the leads and noting the second reading.

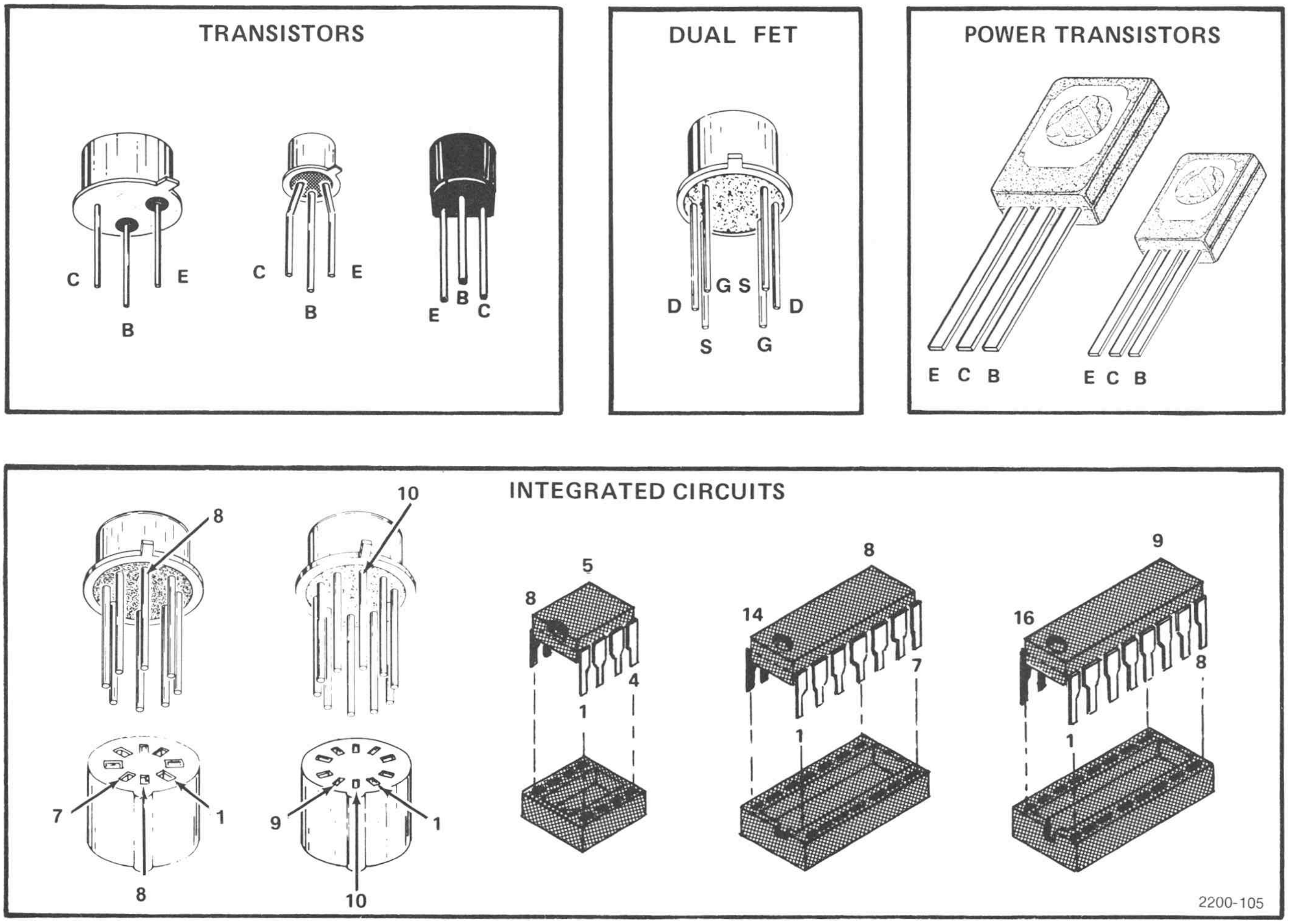


Fig. 5-4. Semiconductor Lead Identification.

Integrated Circuits (ic). Integrated circuits are most easily checked by direct replacement. When substitution is impossible, check input and output signal states as described in the circuit description and on the diagram. Lead configurations for the ic used in this instrument are provided on the inside fold of the schematic or the back of the previous schematic.

Check calibration and performance after a faulty component has been replaced.

If the above procedure fails to locate the trouble, a more detailed analysis must be performed. The Circuit Description section describes the operational theory of each circuit, and may aid to further evaluate the problem.

General Troubleshooting Technique

The following procedure is recommended to isolate a problem and expedite repairs.

1. Ensure that the malfunction exists in the instrument. Check the operation of associated equipment and the operating procedure of the instrument (see Operating Instructions).

2. Determine and evaluate all trouble symptoms. Try to isolate the problem to a circuit or assembly. The block diagram in the Diagrams section can aid in signal tracing and circuit isolation. The circuit boards are generally connected by coaxial cables, so the stages can be checked stage by stage. A spectrum analyzer and tracking generator are convenient tools for these checks.

CAUTION

When measuring voltages and waveforms, use extreme care in placing meter leads or probes. Because of high component density and limited access within the instrument, an inadvertent movement of the leads or probe could cause a short circuit. This may produce transient voltages that can destroy many components.

3. Make an educated guess as to the nature of the problem, such as component failure or calibration, and the functional area most likely at fault.

4. Visually inspect the area or the assembly for such defects as broken or loose connections, improperly seated components, overheated or burned components, chafed insulation, etc. Use a magnifying glass or a jewelers eye loupe to inspect chip parts. Repair or replace all obvious defects. In the case of overheated components, try to determine the cause of the overheated condition and correct before reapplying power.

5. By successive electrical checks, locate the problem. At this time, an oscilloscope and spectrum analyzer are valuable test items for evaluating circuit performance. If applicable, check the calibration adjustments. Before changing an adjustment, note its position so it can be returned to the original setting. This will facilitate recalibration after the trouble has been located and repaired.

6. Determine the extent of the repair needed; if complex, we recommend contacting your local Tektronix Field Office or representative. If minor, such as a simple component replacement, see the Replaceable Electrical Parts list for replacement information. Removal and replacement procedure of the assemblies is described under Corrective Maintenance.

Troubleshooting Shield-Mounted Boards (see Fig. 5-5). The extender board (included in the standard accessories kit) allows the shield-mounted boards to be extended out of the shield for troubleshooting or calibration. Extra pins are added to the interface boards where necessary to provide grounds for signal connections. To look at the output of a stage, remove the following board and connect a bnc-to-square pin adapter cable to the input pins. This will give the output of the stage under test. To isolate a board or stage, remove both the input and output stages. A signal can be fed and the output measured for this stage only.

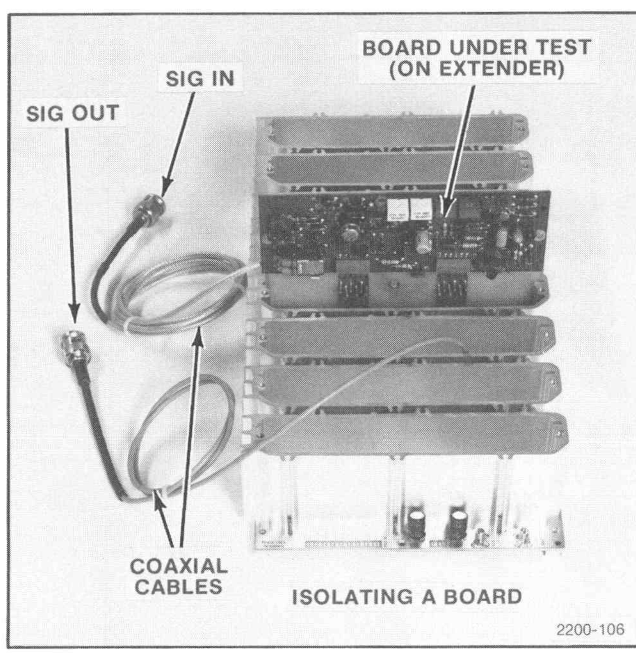


Fig. 5-5. Troubleshooting Shield Mounted Boards.

Refer to the Corrective Maintenance portion of this section for instructions on removing the shield-mounted boards.

Troubleshooting the Power Supply. Access to the power-supply board may be gained by removing the board and heat sink from the rear panel as an assembly. A procedure for this is detailed in the Corrective Maintenance portion of this section.

NOTE

Be sure to connect a ground strap between the power-supply board and chassis ground when operating the instrument with the power supply detached.

CORRECTIVE MAINTENANCE

Corrective maintenance consists of component replacement and instrument repair. Special techniques and procedures, required to replace components in this instrument, are described here.

Obtaining Replacement Parts

Replacement parts are available from or through your local Tektronix, Inc. Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix Field Office or representative will contact you concerning any change in the part number. After repair, the circuits may need recalibration.

Nonreplaceable Parts

There are several components and circuits in the 1450-1 that are not directly replaceable. We recommend that you contact your local Tektronix Field Office or representative concerning servicing of these parts.

PIN Driver and PIN Diodes. New Programmable Read Only Memories (PROMs) must be programmed if one of the old PROMs or precision resistors on the PIN Driver board, or a pin diode in the PIN Attenuator circuit needs to be replaced. Because each PROM program is unique, the PROMs and pin diodes are not directly replaceable. The affected boards are A30/A21 and A31/A22. The board-pair A30/A21 must be replaced if a pin diode on A21, or a PROM and/or a precision resistor on A30 needs to be replaced. The same applies to A31/A22 board-pair. Each pair of boards is listed under one assembly in the Replaceable Electrical Parts list, namely:

1. A80—Tektronix Part No. 672-0638-00 for A30/A21 pair.

2. A82—Tektronix Part No. 672-0639-00 for A31/A22 Opt. 01 and Opt. 02 and A82 Tektronix Part No. 672-0639-01 for A31/A22 Opt. 03.

See the Replaceable Electrical parts list for replacement information.

Selected Components

During calibration at the factory, some components are selected, if necessary, to help the instrument meet the performance requirements. Table 5-3 lists these components, their nominal values, and the criteria for selection.

Table 5-3

SELECTED COMPONENTS

Component Number	Nominal Value	Selection Criteria
A20R07	39.2 Ω	50 Ω IF Input Impedance.
A21C85	Open	Return Loss.
A22R52[a]	10 Ω or open	Mixer Balance.
A22R53[a]	10 Ω or open	Mixer Balance.
A24C90	15—30 pF	SAW filter and amplitude compensation.
A24R90	500 Ω or greater	SAW filter tilt and amplitude compensation.
A25C90	3—24 pF	SAW filter tilt and amplitude compensation.
A25R90	500 Ω or greater	SAW filter tilt and amplitude compensation.
A28R40	100 kΩ or greater	Dc unbalance with temperature.
A28R43	100 kΩ or greater	Dc unbalance with temperature.
A29R40	100 kΩ or greater	Dc unbalance with temperature.
A29R43	100 kΩ or greater	Dc unbalance with temperature.
A55R04	332 Ω	Limiter phase shift.

[a]**Options 1 and 2—B010121 and up; Option 3—B010402 and up.**

Soldering Chip Components (See Fig. 5-6)

Many circuit boards in this instrument have chip components. The contacts on chip resistors and capacitors are usually plated with silver. These components should be soldered with a 3% silver-bearing solder (Tektronix Part No. 006-0064-00).

Remove excess solder from the circuit-board pads before soldering so the component will lie flat. If the first solder joint is made with the component at an angle, soldering the second joint will cause pressure to be applied to the first, possibly breaking it. Use solder wick or other solder removers to remove the excess solder and clean the surface.

CAUTION

Do not apply a soldering iron directly to the chip component contacts. This will burn the silver plating.

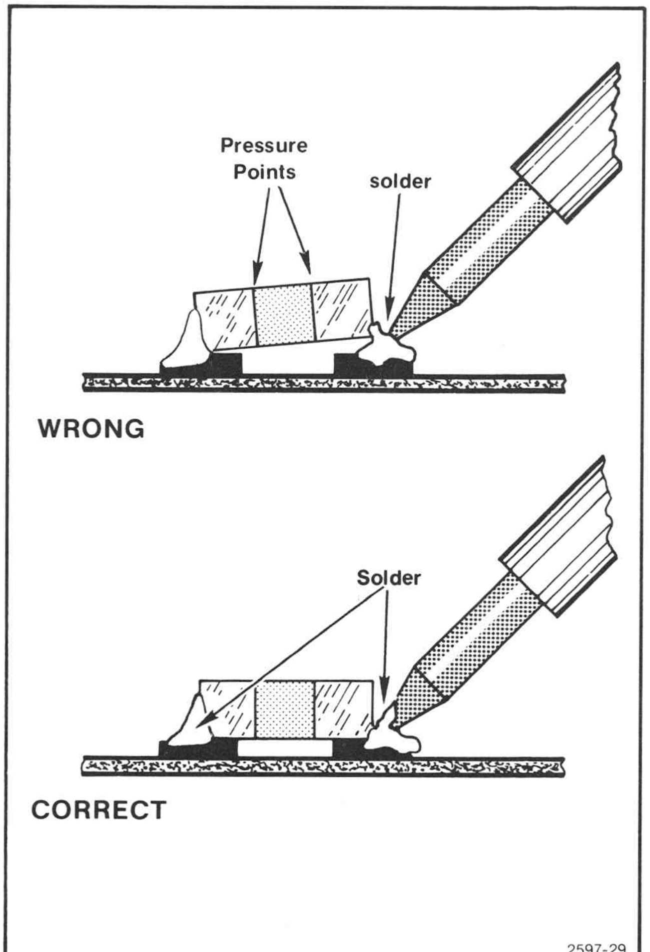


Fig. 5-6. Soldering Chip Components.

TORX® Screws

This instrument uses self-tapping TORX head screws. A TORX screwdriver is supplied in the accessories kit for the 1450-1. Also, a tip for magnetic-tip or air-driven screwdrivers is available (Tektronix Part No. 003-0814-00).

Do not use more than about 8 to 10 inch-pounds of torque when tightening the TORX screws. If a screw head breaks off, leaving the screw body in the metal, the screw should be replaced using the following procedure:

1. Remove any other screws holding down the shield cover, and lift the cover off. This will expose part of the screw stud.

2. Use a pair of pliers to remove the screw.

3. Replace the shield cover, and insert a 3 mm X 20 mm TORX screw (Tektronix Part No. 213-0812-00).

TORX® is a registered trademark of Camcar Screw & Mfg.

Fuse Replacement

Three fuses are used in this instrument. The line fuse is located in the rear-panel line-voltage selector, the +5 V fuse is located on the Power-Supply board (A70), and the Audio Output fuse is located on the Audio Interface board (A44). Use only correct value fuses when replacing.

NOTE

There is a spare audio fuse on the Audio Interface board, A44.

Power Transformer Replacement

If the power transformer becomes defective, contact your local Tektronix Field Office or representative for replacement. Replace only with a direct-replacement Tektronix transformer.

Power Switch Replacement

If the power switch becomes defective, replace only with a direct-replacement, safety-approved switch. Use the following replacement procedure.

1. Remove the left side panel and the left front corner piece.

NOTE

An alternate method is to remove the IF Interface board (A32).

2. Remove the twelve-sided nut and washer from the front panel.

3. Pull the power switch back from the front panel, and remove the screws holding the power cable. (Note the locations of the wires on the switch for replacement.)

To replace, reverse the procedure.

Pushbutton Switch Replacement

Before removing a pushbutton switch, disengage the pushbutton actuating arm so that it does not project beyond the rear of the switch. Next, carefully pry back the plastic retainer clip at the rear of the switch with the tip of a small screwdriver. See Fig. 5-7. Remove by lifting the switch body up and back from the front retainer clip.

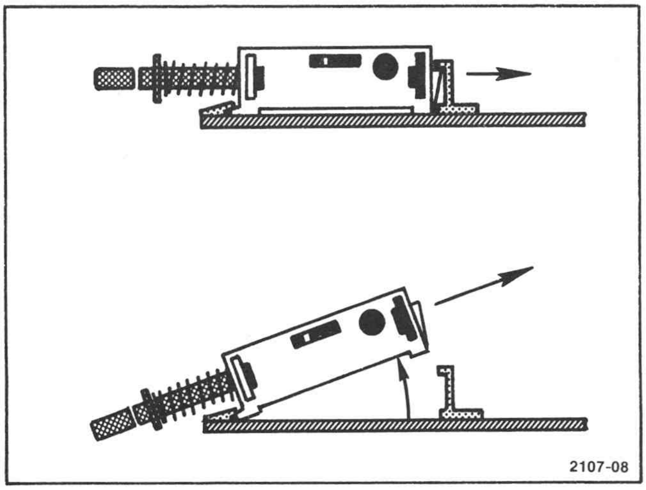


Fig. 5-7. Replacing Pushbutton Switches.

Indicator Lamp Replacement

Use the following procedure to remove LED indicator lights:

1. Pull the harmonica connector from the LED leads.

2. Grasp the outer ring at the rear of the light with needle-nose pliers, and remove.

3. Grasp both leads with the pliers and pull the LED out of the front-panel assembly.

To replace, reverse the procedure. Figure 5-8 illustrates the polarity of connections to be observed.

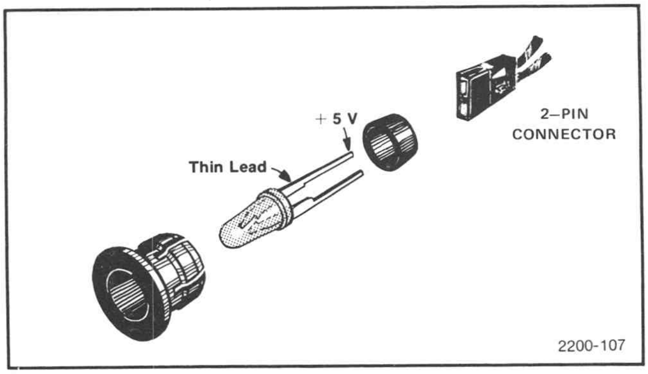


Fig. 5-8. Indicator Lamp Replacement.

Square Pin Replacement

A pin replacement kit including necessary tools, instructions, and replacement pins is available from Tektronix, Inc. Order Tektronix Part No. 040-0542-00.

Replacing Assemblies

Replacing the Attenuator Assembly (A1)

CAUTION

Do not disassemble the attenuator. Replace as a unit.

1. Remove the harmonica connectors at P10 and P20 of A1 (note their positions for replacement).

2. Loosen the semi-rigid coaxial-lead connectors, using a 5/16-inch open-end wrench.

3. Loosen and remove the attenuator mounting screws located on the opposite side of the chassis.

4. Remove the attenuator.

To replace, reverse the procedure.

CAUTION

When reconnecting the semi-rigid cables, be sure that the connectors fit smoothly into the attenuator connectors.

Replacing Shield-Mounted Boards

Each shield-mounted board has a tooling hole for extracting the board from the shield. A small screwdriver or the tip of a pair of needle-nose pliers may be used as levers against the shield to get the board loose. A simple extracting tool may be made from a large paper clip, as shown in Fig. 5-9.

To remove the boards:

1. Remove the shield cover from the desired board location.

2. Use an extraction tool to remove the board.

CAUTION

When replacing the board into the shield, keep the board to the outside rail (fin side) of the shield to align on the proper interface-board pins. Avoid forcing the board, as pins may be easily bent.

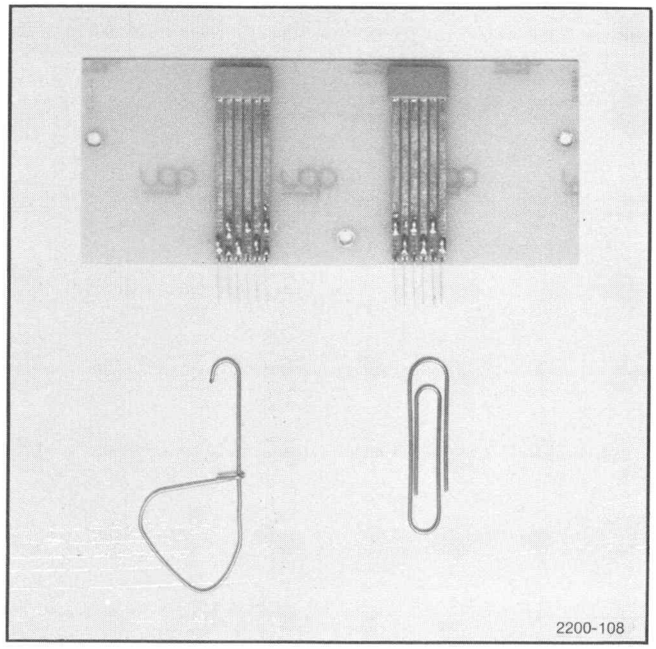


Fig. 5-9. Circuit Board Extracting Tool and Extender Board.

Replacing the IF Interface Board (A32) (See Fig. 5-10)

1. Remove all wire connectors from the board.

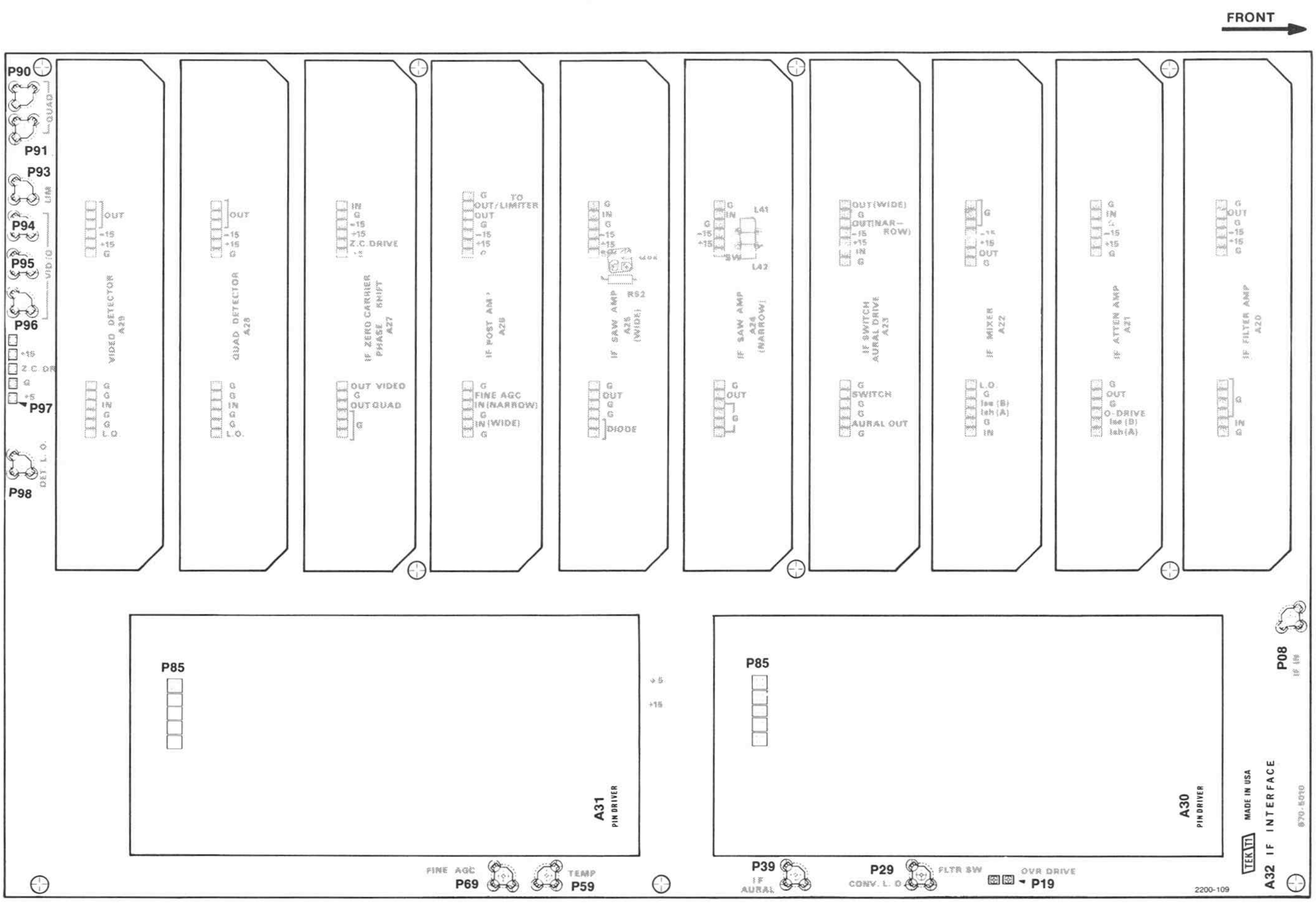


Fig. 5-10. Replacing the IF Interface Board (A32).

@

2. Remove the eleven screws holding the board down.

To replace, reverse the procedure. Be careful not to bend the square pins or the center conductor of the Peltola cable connectors.

Replacing the Phase Lock Interface Board (A59) (See Fig. 5-11)

1. Remove the wire connectors from both ends of the board.

2. Remove the eight screws (four on each side) from the sides of the board.

3. Remove the board.

To replace, reverse the procedure. Be careful when replacing the wire connectors. See that the square pins and Peltola center conductors aren't bent.

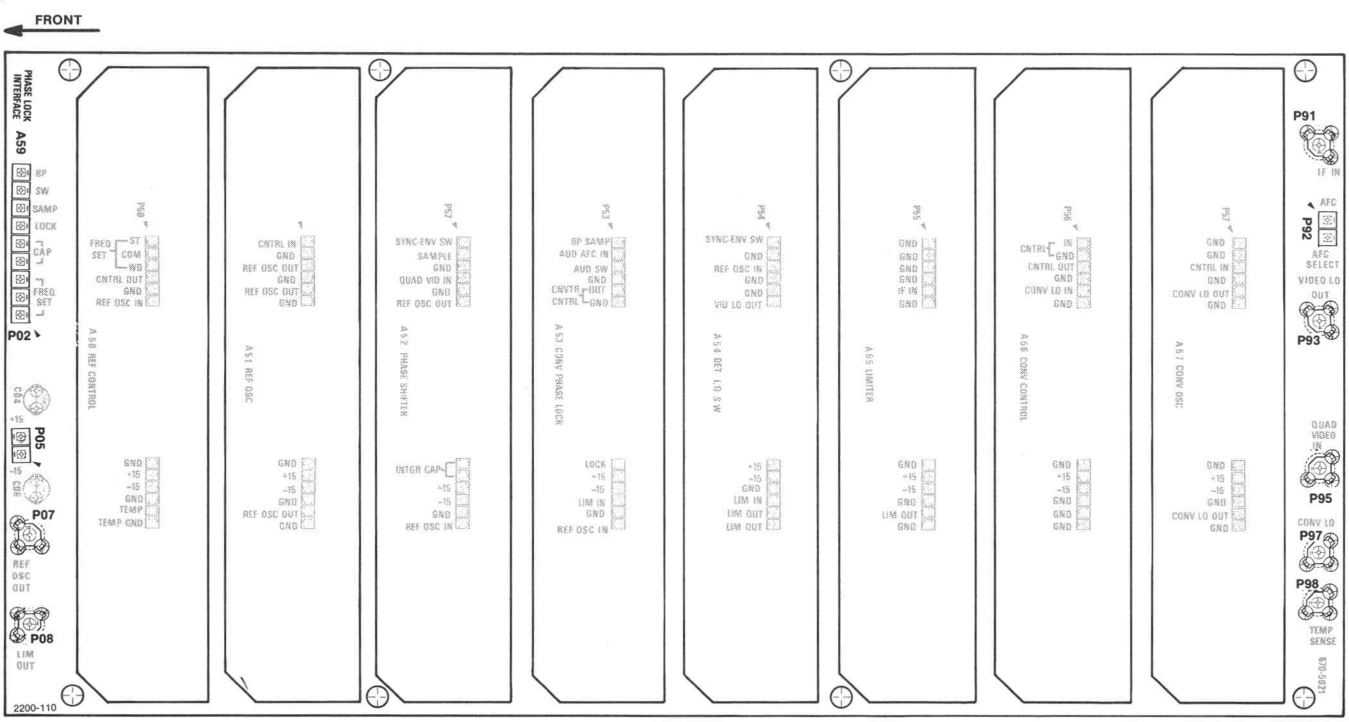


Fig. 5-11. Replacing the Phase Lock Interface Board (A59).

Replacing the Phase Lock Switch Board (A58) (See Fig. 5-12)

1. Remove the wire connectors to P02, P05, P07, and P08 on the Phase Lock Interface board (A59).

2. Remove the wire connectors to P53, P59, and P98 on the Phase Lock Switch board (A58).

3. Remove the board.

To replace, reverse the procedure. Be careful when replacing the wire connectors. See that the square pins and Peltola center conductors aren't bent.

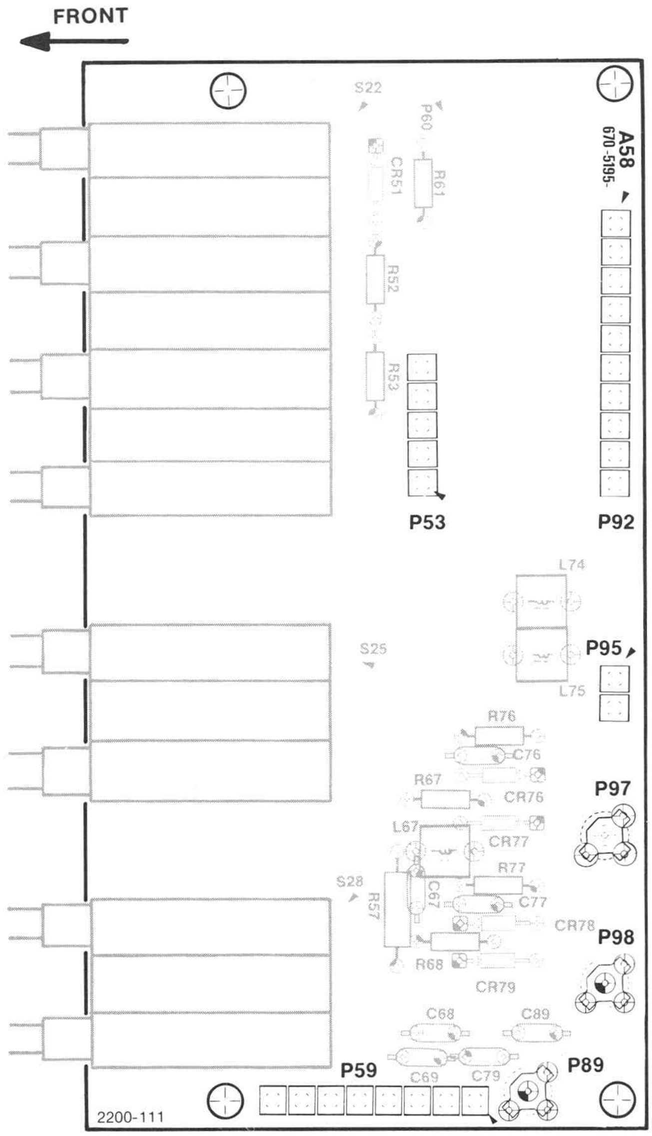


Fig. 5-12. Replacing the Phase Lock Switch Board (A58).

@

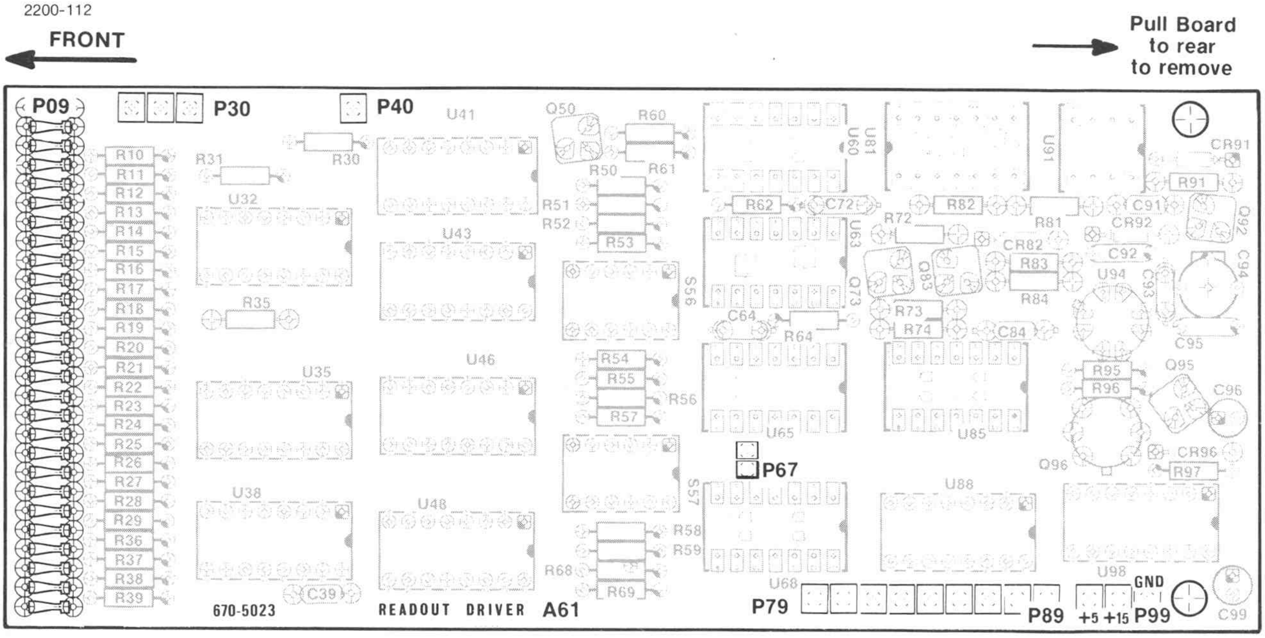


Fig. 5-13. Replacing the Readout Driver Board (A61).

Replacing the Readout Driver Board (A61) (See Fig. 5-13)

1. Remove all harmonica connectors from the Readout Driver board (A61).

2. Remove the two screws from the rear corners.

3. Pull back from the Readout board (A62) to remove.

To replace, reverse the procedure. Be careful not to bend any pins on the Readout board (A62).

Replacing the Readout Board (A62) (See Fig. 5-14)

1. Remove the Readout Driver board (A61).

2. Remove the two shouldered spacer posts, using a 3/16-inch Hex driver.

3. Remove the Readout board.

To replace, reverse the procedure.

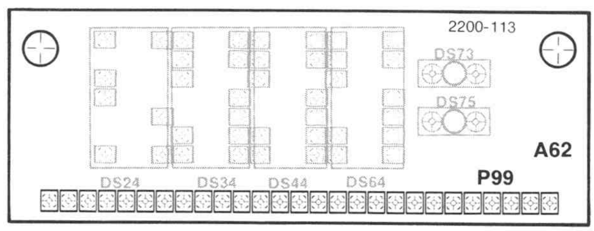


Fig. 5-14. Replacing the Readout Board (A62).

Replacing the AGC Control Board (A60) (See Fig. 5-15)

1. Remove the Readout Driver board (A61).

2. Remove all harmonica connectors on A60, except P01, P31, and P75, which are already disconnected from A61.

3. Remove the screws from the four corners, and the spacer posts from the center slides, using a 3/16-inch Hex driver.

4. Pull back until the switch pushbuttons clear the front panel, and remove the board.

To replace, reverse the procedure.

Replacing the Audio Interface Board (A44) (See Fig. 5-16)

1. Remove all connectors.

2. Remove the eight screws holding the board.

3. Remove the board by pulling it back from the front panel to clear the switches.

To replace, reverse the procedure.

Replacing the Power Supply Board (A70) (See Fig. 5-17)

1. Remove all harmonica connectors.

2. Remove the four Allen screws (7/64-inch head) from the heat sink on the rear panel.

3. Remove the heat sink and power supply assembly from the rear panel.

NOTE

If troubleshooting the Power Supply, connect a ground strap between P50 or the heat sink and chassis ground on the 1450-1, and reconnect P08, the power transformer secondaries, to the board.

4. Remove the screws from Q05, Q34, and Q95.

5. Remove the seven screws holding the Power Supply board.

6. Remove the board from the heat sink.

When replacing the Power Supply board, be sure to replace the mica insulating washers between the power transistors and the heat sink. Check that the transistors and heat sink have adequate thermal-conducting grease for proper thermal conduction.

WARNING

Handle grease with care. Avoid getting grease in the eyes. Wash hands thoroughly after use.

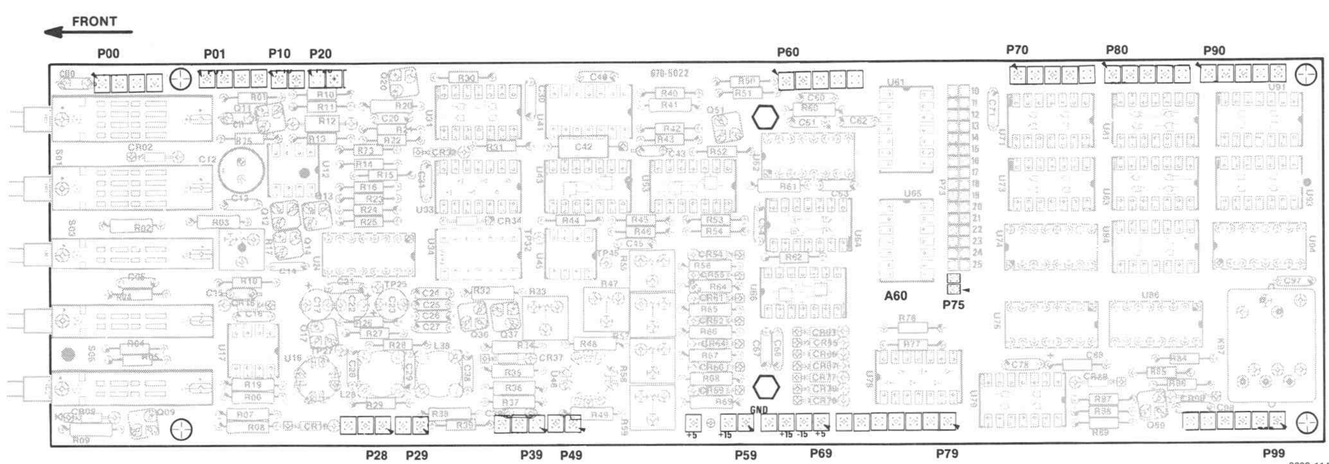


Fig. 5-15. Replacing the AGC Control Board (A60).

@

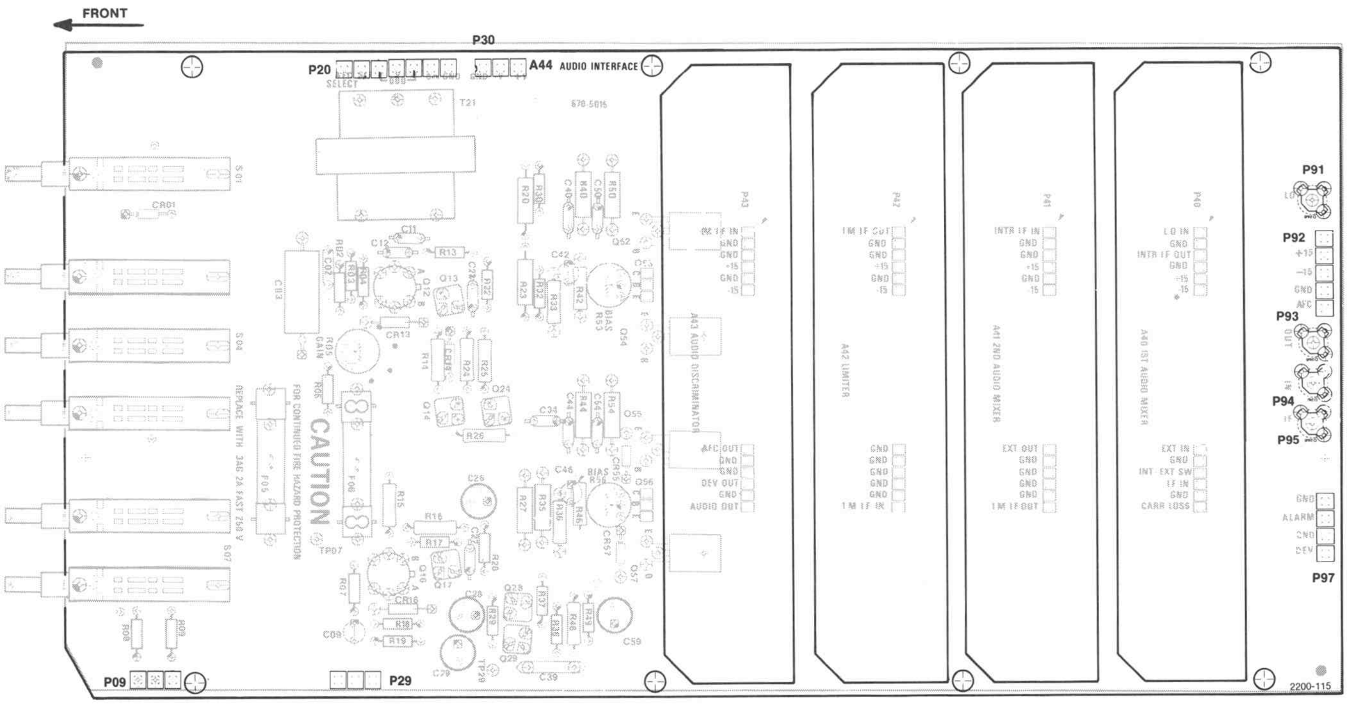
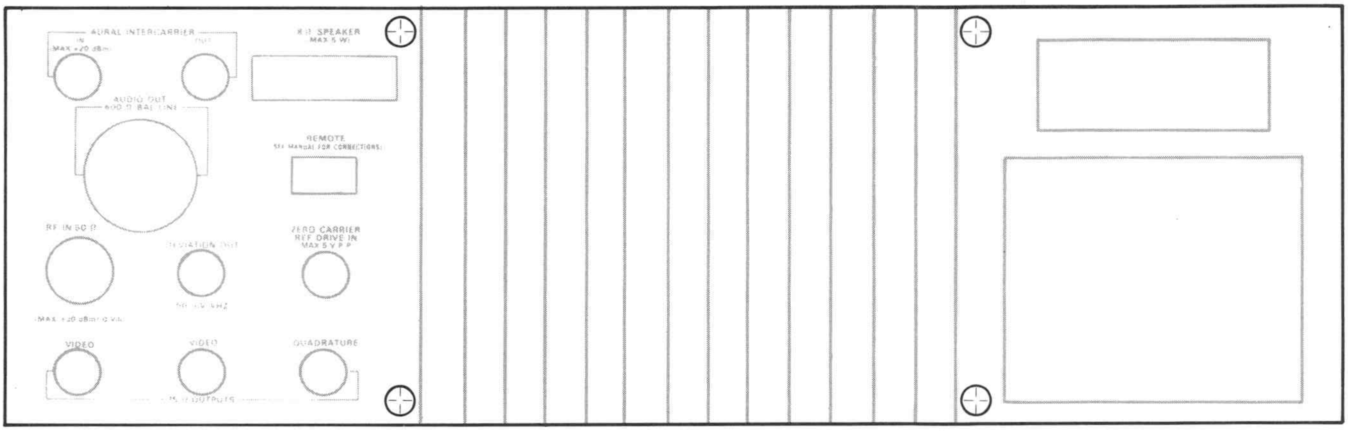
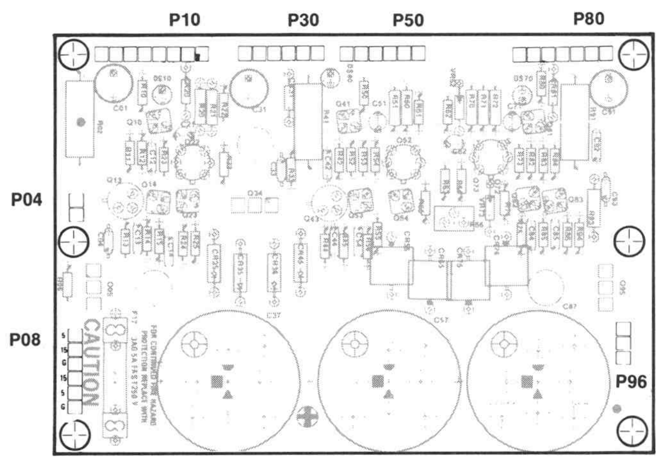


Fig. 5-16. Replacing the Audio Interface Board (A44).



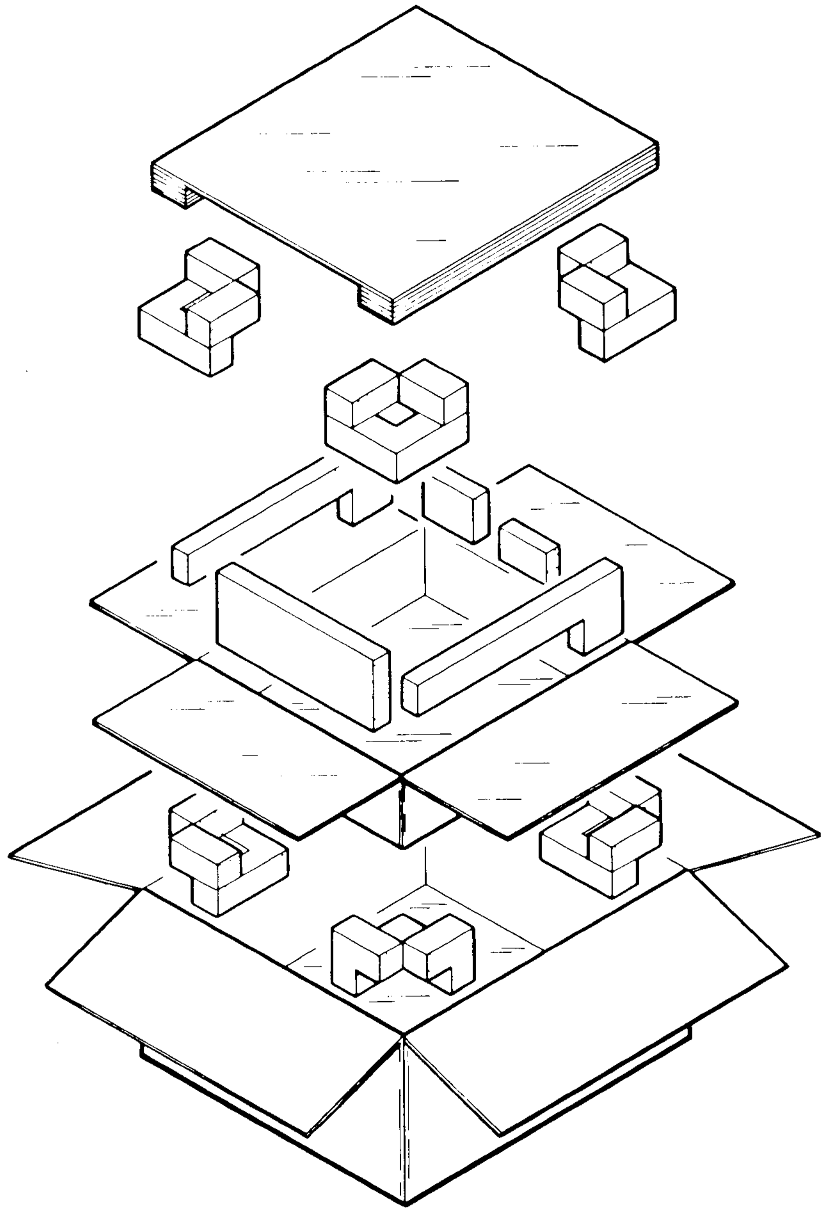
(a) Rear view of instrument.



(b)

2200-116

Fig. 5-17. Replacing the Power Supply Board (A70).



Repackaging for Shipment:

If the Tektronix instrument is to be shipped to a Tektronix Service Center for service or repair, attach a tag showing: owner (with address) and the name of an individual at your firm that can be contacted, complete instrument serial number and a description of the service required.

Save and re-use the package in which your instrument was shipped. If the original packaging is unfit for use or not available, repackage the instrument as follows:

1. Obtain a carton of corrugated cardboard having inside dimensions of no less than six inches more than the instrument dimensions; this will allow for cushioning. Refer to Table 1 for carton test strength requirements.
2. Surround the instrument with polyethylene sheeting to protect the finish of the instrument.
3. Cushion the instrument on all sides by tightly packing dunnage or urethane foam between carton and instrument, allowing three inches on all sides.
4. Seal carton with shipping tape or industrial stapler.

Table 1

Shipping Carton Test Strength

Gross Weight (lb.)	Carton Test Strength (lb.)
0 — 10	200
10 — 30	275
30 — 120	375
120 — 140	500
140 — 160	600

2200-117

Fig. 5-18. Repackaging Instructions.

SECTION 6
1450-SERIES OPTIONS

Introduction

The demodulator mainframe described in this manual is compatible with the CCIR System denoted by the suffix (dash-number) in the title according to Table 6-1. Each demodulator mainframe is equipped with an identification tag that includes system identification and visual **if.**

Table 6-1
VISUAL IF OPTIONS

Mainframe	Option	Visual
1450-X*	01†	37.00 MHz
1450-X*	02	38.90 MHz
1450-X*	03†	45.75 MHz

*The letter X is replaced by a number denoting the CCIR System. For System M, the number is 1; for System B and G the number is 2; and for System I the number is 3.

†Not available for Systems B,G, and I.

OPTION 10
A43 Audio Discriminator Board

The 1450-Series Option 10 consists of an Audio Discriminator circuit board that has been modified to provide a wide-band audio output available at the DEVIATION OUTput of the 1450-Series instrument. This output is located at the rear panel of the 1450-Series mainframe. The DEVIATION OUTput is source-terminated in 75 ohms. The narrow-band and wide-band audio circuits have individual gain adjustments, R81 for the wide-band mode and R71 for the narrow-band mode. The wide-band mode of operation is provided to drive a demultiplexer.

Diagram 16 depicts the modified board, and is divided into four circuit blocks, namely:

1. Pulse Count Discriminator

2. Wideband Filter and Amplifier

3. Narrow band Filter and Amplifier

4. Aural Phase-Lock Frequency Control

The Pulse Count Discriminator, Wideband Filter and Amplifier, and Aural Phase-Lock Frequency Control circuits are identical to those found in the standard 1450-Series Discriminator board, except that some values and circuit numbers have been changed in the Wideband Filter and Amplifier, and the Aural Phase-Lock Frequency Control circuits. Values have been changed in these circuits to set the proper bandpass and gains.

A check of the standard 1450-Series circuit description associated with this board applies to the aforementioned circuits, keeping in mind that values and some circuit numbers have changed.

Referring to Diagram 16, the discriminator drives the wideband 5-pole LC-filter. The termination for the filter is R43 and R63. There are two stages of amplification, U85B and U85A, with the output of U85A connected to pin 3 of P65. Wide-band mode is selected when pins 2 and 3 of P65 are jumpered, and narrow-band when pins 1 and 2 are jumpered.

Pin 7 of U85B drives a narrow-band, 3-pole active filter with U84A being a unity-gain stage, and U84B providing the gain. The overall gain of the narrow-band filter and amplifier circuit is determined by input resistors R67 and part of R71, and feedback resistors R65 and the other part of R71. Pin 7 of U84B drives pin 1 of P65, the mode selector jack.

For an example, (1450-1 Option 03—45.75 MHz Vision IF) is the same as 1450 Option *—45.75 MHz Vision IF).

The selected output from pin 2 of P65 drives the DEVIATION OUTput through R64, the 75-ohm source termination.

Table 6-2
ELECTRICAL SPECIFICATION

Characteristics	Performance Requirements	Supplemental Information
DEVIATION OUTput		
Total Harmonic Distortion		
30 Hz to 15 kHz	0.2% (54 dB) or less.	In Wide-Band mode, and 1 V p-p into 75 ohms at 25 kHz deviation.
15 kHz to 55 kHz	0.5% (46 dB) or less.	
Frequency Response	30 Hz to 55 kHz ±0.4db in Wide-Band mode.	-3 db or greater at 80 kHz.
Output Level	0.177 Vrms (0.5 V p-p)±2%	0.25 V to 1 V p-p with 25 kHz deviation in wide band. Calibrated for 50 mV peak per kHz in narrow band.

Specification

Table 6-2 is a list of the performance requirements for the 1450-Series Option 10. Meeting electrical performance requirements listed in this section and section 4 of the manual ensures an accurate instrument. These performance requirements are specifically tested by performing the Performance Check Procedure, and ensured by performing the Adjustment Procedure found in Section 6 of this manual.

Items listed as Performance Requirements are quantitative and usually stated in terms of tolerance limits. Performance Requirements are guaranteed and are verified by a performance check procedure.

The 1450-Series audio specifications are as stated in section 4 of this manual with the following exceptions when this option is installed:

Performance Check Procedure

NOTE

1. With the exception of the 75-ohm feed-through terminator, all test equipment used to check and adjust the Option 10 circuit board are listed as recommended test equipment in Section 4 of this manual.

2. Be sure that P65 pins 2 and 3 on A43 Audio Discriminator board are jumpered before performing checks. This ensures that the DEVIATION OUTput is in a wide-band mode.

1. Check Total Harmonic Distortion (Wide-Band Mode) (0.2% or less from 30 Hz to 15 kHz) (0.5% or less from 15 kHz to 55 kHz)

a. Set the output frequency of an audio generator (SG 502) at 10.395 kHz using a frequency counter, then connect the test equipment as shown in Fig. 6-1, using this generator as the audio source.

b. Vary the generator output level from minimum to maximum while noting the carrier amplitude. The carrier amplitude should be maximum at minimum and maximum generator output level. Set the generator output level such that the carrier nulls. This sets deviation at 25 kHz peak. See Fig. 6-2 for typical waveforms.

NOTE

Once the audio generator amplitude has been set up for 25 kHz deviation, the frequency can be varied while maintaining the 25 kHz deviation amplitude as long as the generator output amplitude does not change with frequency.

c. Disconnect the cable connected to the 1450-Series INTERCARRIER OUTput and connect it to the DEVIATION OUTput. Insert a 75-ohm feed-through terminator between the spectrum analyzer and the cable connected to the DEVIATION OUTput. Set the spectrum analyzer Dot Frequency at 30 kHz, Time/Div at 10 kHz, (L3) Input Impedance at 1,000,000 ohms, and Input Reference at dBV.

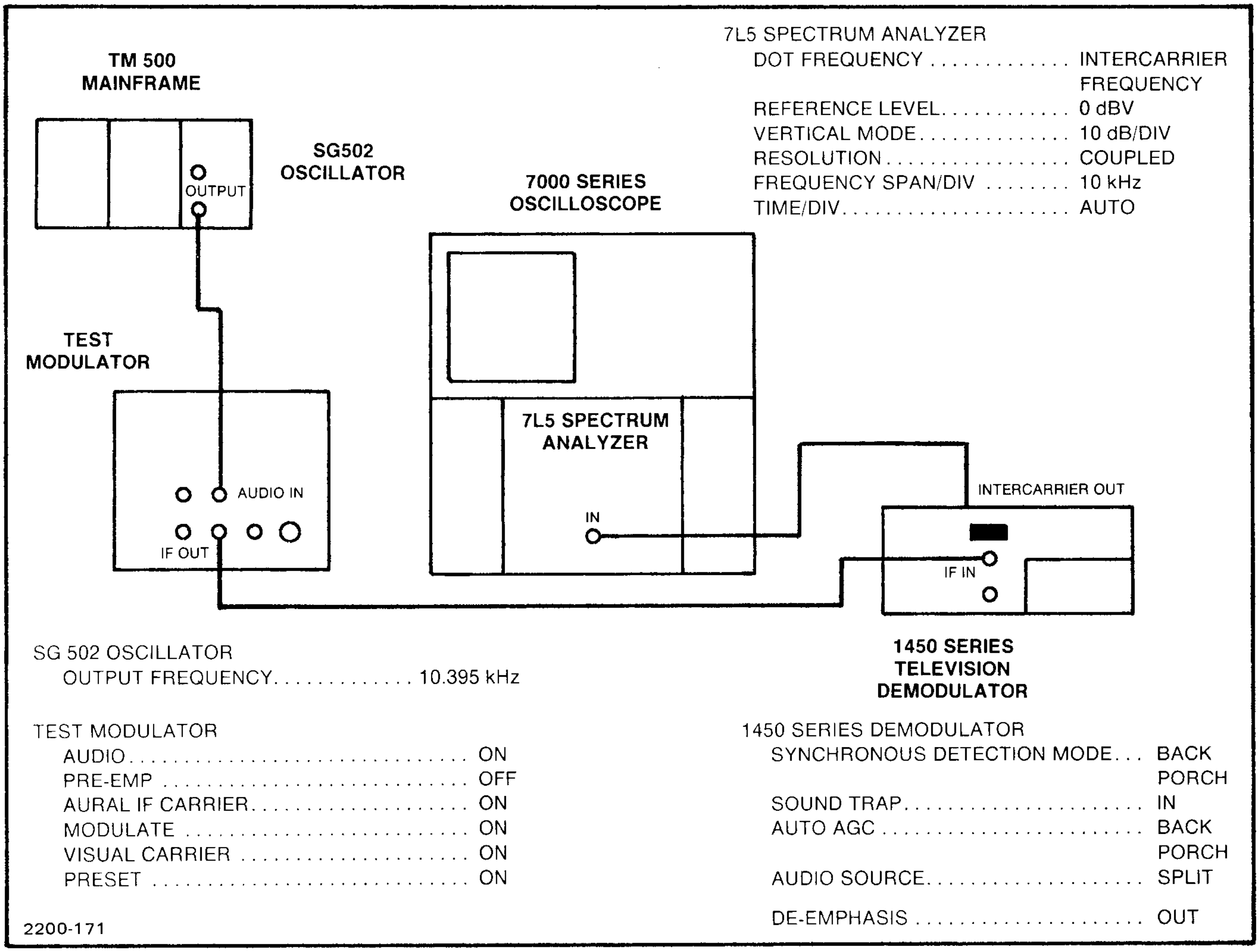
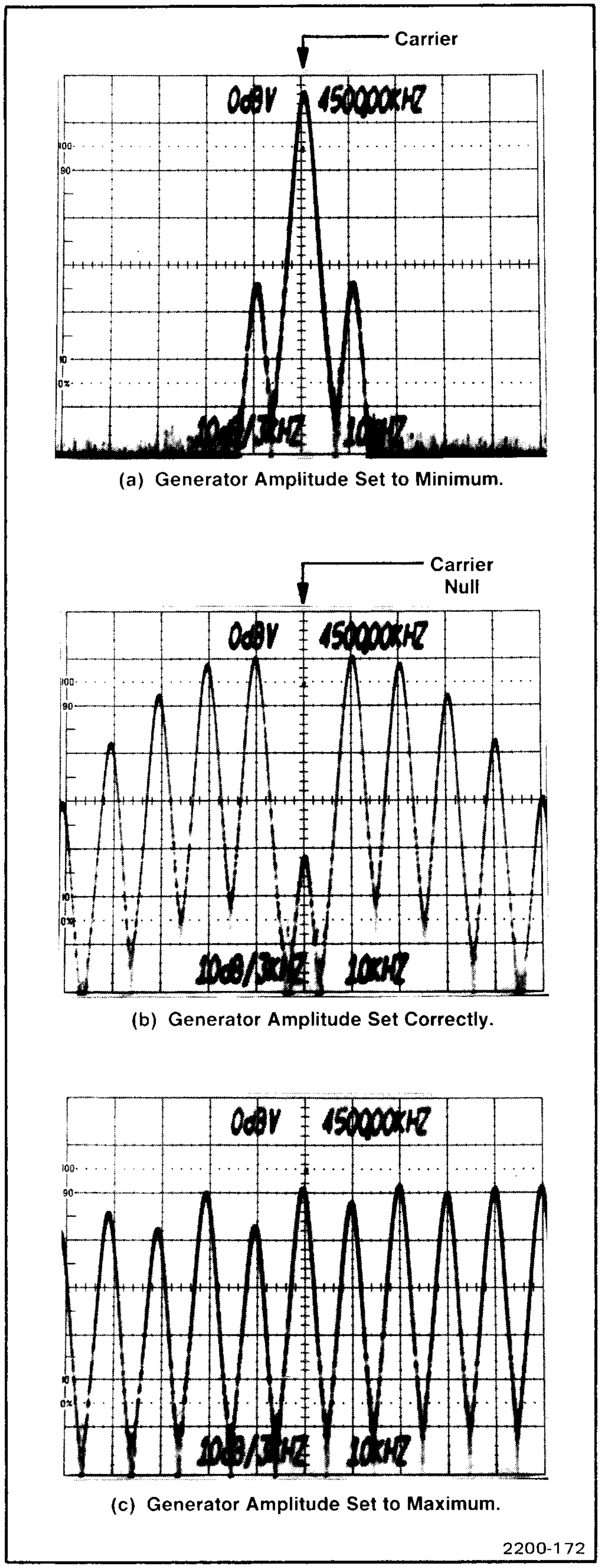


Fig. 6-1. Test Equipment Setup for Setting 25 kHz Deviation.



(a) Generator Amplitude Set to Minimum.

(b) Generator Amplitude Set Correctly.

(c) Generator Amplitude Set to Maximum.

Fig. 6-2. Typical Deviation Output Waveforms Using 7L5 Spectrum Analyzer.

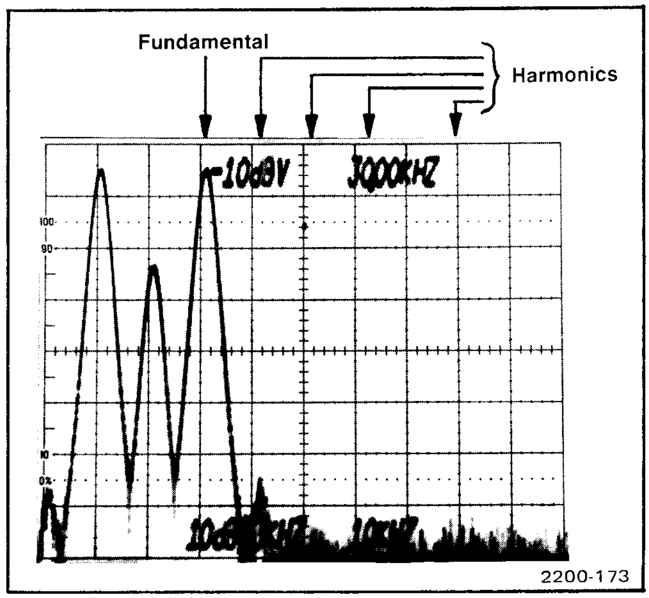


Fig. 6-3. Harmonic Distortion Measurment Waveform.

d. Check that harmonics of the 10.395 kHz audio signal are down at least 54 dB (0.2%) from the fundamental. See Fig. 6-3.

e. Set the audio generator output frequency at 30 Hz, 1 kHz, and 15 kHz and make a note of the harmonic amplitudes displayed on the spectrum analyzer at these settings.

f. Check that the harmonics are down at least 54 dB from the fundamental.

g. Reset the audio generator output frequency to 16 kHz, 20 kHz, 30 kHz, 40 kHz, and 45 kHz while making a note of the harmonic amplitudes displayed on the spectrum analyzer.

h. Check that the harmonics are down at least 46 dB (0.5%) from the fundamental.

i. Disconnect all test equipment from the 1450-Series demodulator.

2. Check DEVIATION OUTput Frequency Response (±0.4 dB from 30 Hz to 55 kHz)

a. Connect the test equipment as shown in Fig. 6-4.

b. Check that frequency response is flat within 0.4 dB from 30 Hz to 55 kHz. Check also that the response is down 3 dB or better at 80 kHz.

3. Check DEVIATION OUTput Level (0.177 Vrms (0.5 V p-p) ±2%)

a. Set the output frequency of an audio generator (SG 502) at 10.395 kHz using a frequency counter, then connect the test equipment as shown in Fig. 6-1 using this generator as the audio source.

b. Vary the generator output level from minimum while noting the carrier amplitude. The carrier amplitude should be maximum at minimum and maximum generator output level. Set the generator output level such that the carrier nulls. This sets deviation at 25 kHz peak. See Fig. 6-2 for typical waveforms.

c. Connect the DEVIATION OUTput to a **rms** voltmeter through a 75-ohm feed-through terminator.

d. Check that the voltmeter indicates 0.177 V**rms** (0.25 V p-p to 1 V p-p) with 25 kHz deviation.

Adjustment Procedure

NOTE

1. With the exception of the 75-ohm feed-through terminator, all test equipment used to check and adjust the Option 10 circuit board are listed as recommended test equipment in Section 4 of this manual.

2. Be sure that P65 pins 2 and 3 on A43 Audio Discriminator board are jumpered before performing the following adjustments (Wide-Band mode).

1. Adjust Wideband Filter (L41 and L61 on A43 Audio Discriminator board)

a. Connect the test equipment as shown in Fig. 6-4.

b. Adjust L41 and L61 for a flat response within 0.4 dB (1 minor division) from 30 Hz to 55 kHz. The response should be 3 dB down or greater at 80 kHz.

2. Adjust DEVIATION OUTput Wideband Amplitude (R81 On A43 Audio Discriminator board)

a. Set the output frequency of an audio generator (SG 502) at 10.395 kHz using a frequency counter, then connect the test equipment as shown in Fig. 6-1, using this generator as the audio source.

b. Vary the generator output level from minimum to maximum while noting the carrier amplitude. The carrier amplitude should be maximum at minimum and maximum generator output level. Set the generator output level such that the carrier nulls. This sets deviation at 25 kHz peak. See Fig. 6-3 for typical waveforms.

c. Connect the DEVIATION OUTput to a **rms** voltmeter through a 75-ohm feed-through terminator.

d. Adjust R81 such that the voltmeter indicates 0.177 V**rms** (0.5 p-p) or the desired level.

3. Adjust DEVIATION OUTput Narrowband Level (R71 on A43 Audio Discriminator board)

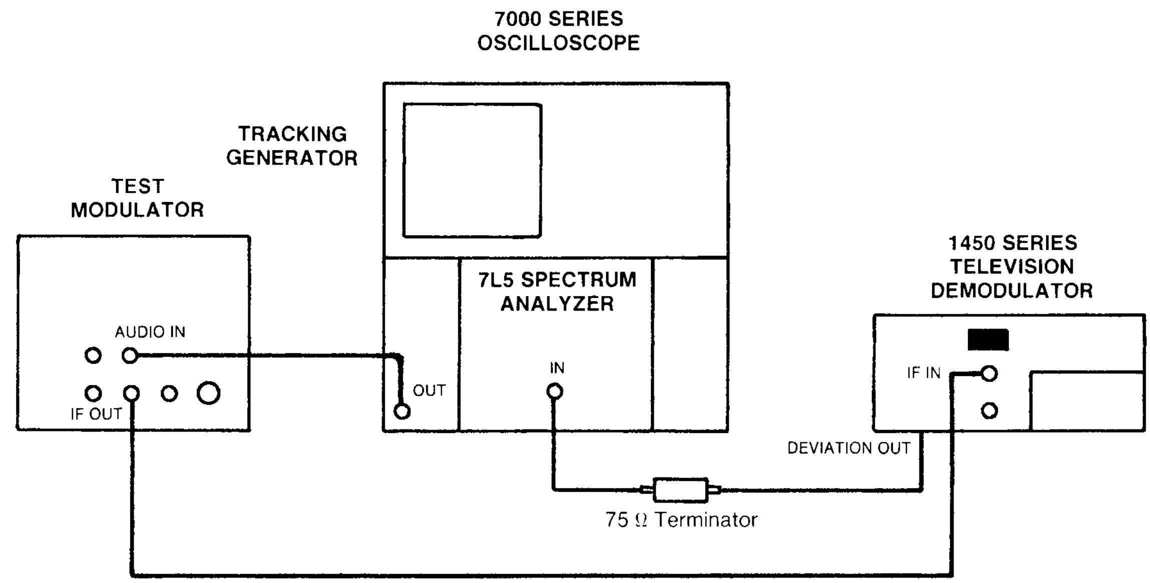
a. Set the output frequency of an audio generator (SG 502) at 10.395 kHz using a frequency counter, then connect the test equipment as shown in Fig. 6-1, using this generator as the audio source.

b. Vary the generator output level from minimum to maximum while noting the carrier amplitude. The carrier amplitude should be maximum at minimum and maximum generator output level. Set the generator output level such that the carrier nulls. This sets deviation at 25 kHz peak. See Fig. 6-2 for typical waveforms.

c. On the Discriminator board, move P65 jumper from pins 2 and 3 to pins 1 and 2 (Narrow-Band Mode).

d. Connect the DEVIATION OUTput to a **rms** voltmeter.

e. Adjust R71 such that the voltmeter indicates 0.883 V**rms** (2.5 V p-p).



TEST MODULATOR
- Audio .... ON
- PRE-EMP .... OFF
- VISUAL IF CARRIER .... ON
- PRESET .... ON
- AURAL IF CARRIER .... ON
- MODULATE .... ON
- CARRIER LEVEL .... MIDRANGE

1450 SERIES DEMODULATOR
- SYNCHRONOUS DETECTION MODE... BACK PORCH
- SOUND TRAP..................... IN
- AUTO AGC .... BACK PORCH
- AUDIO SOURCE................... SPLIT

7L5 SPECTRUM ANALYZER
- DOT FREQUENCY .... 40 kHz
- REFERENCE LEVEL............... −20 dBV
- VERTICAL MODE................. 2 dB/DIV
- RESOLUTION.................... COUPLED
- FREQUENCY SPAN/DIV .... 10 kHz
- TIME/DIV...................... AUTO
- TRACKING GEN .... ON
- TRACKING GEN OUTPUT .... −20 dBV
- L3 INPUT TERMN................ 1 MΩ
- L3 INPUT REF.................. dBV

2200-174

Fig. 6-4 Test Equipment to Measure Deviation Output Frequence Response

NOTE

The schematic for Option 10 is located in the fold-out diagrams section, Audio Discriminator 16.

REPLACEABLE ELECTRICAL PARTS

PARTS ORDERING INFORMATION

Replacement parts are available from or through your local Tektronix, Inc. Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc. Field Office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

LIST OF ASSEMBLIES

A list of assemblies can be found at the beginning of the Electrical Parts List. The assemblies are listed in numerical order. When the complete component number of a part is known, this list will identify the assembly in which the part is located.

CROSS INDEX-MFR. CODE NUMBER TO MANUFACTURER

The Mfr. Code Number to Manufacturer index for the Electrical Parts List is located immediately after this page. The Cross Index provides codes, names and addresses of manufacturers of components listed in the Electrical Parts List.

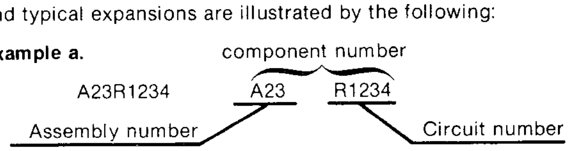
ABBREVIATIONS

Abbreviations conform to American National Standard Y1.1.

COMPONENT NUMBER (column one of the Electrical Parts List)

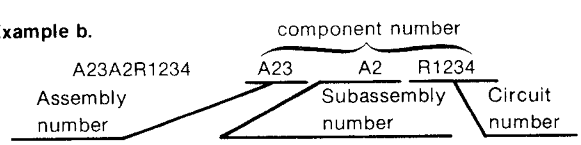
A numbering method has been used to identify assemblies, subassemblies and parts. Examples of this numbering method and typical expansions are illustrated by the following:

Example a.



Read: Resistor 1234 of Assembly 23

Example b.



Read: Resistor 1234 of Subassembly 2 of Assembly 23

Only the circuit number will appear on the diagrams and circuit board illustrations. Each diagram and circuit board illustration is clearly marked with the assembly number. Assembly numbers are also marked on the mechanical exploded views located in the Mechanical Parts List. The component number is obtained by adding the assembly number prefix to the circuit number.

The Electrical Parts List is divided and arranged by assemblies in numerical sequence (e.g., assembly A1 with its subassemblies and parts, precedes assembly A2 with its subassemblies and parts).

Chassis-mounted parts have no assembly number prefix and are located at the end of the Electrical Parts List.

TEKTRONIX PART NO. (column two of the Electrical Parts List)

Indicates part number to be used when ordering replacement part from Tektronix.

SERIAL/MODEL NO. (columns three and four of the Electrical Parts List)

Column three (3) indicates the serial number at which the part was first used. Column four (4) indicates the serial number at which the part was removed. No serial number entered indicates part is good for all serial numbers.

NAME & DESCRIPTION (column five of the Electrical Parts List)

In the Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, the U.S. Federal Cataloging Handbook H6-1 can be utilized where possible.

MFR. CODE (column six of the Electrical Parts List)

Indicates the code number of the actual manufacturer of the part. (Code to name and address cross reference can be found immediately after this page.)

MFR. PART NUMBER (column seven of the Electrical Parts List)

Indicates actual manufacturers part number.

CROSS INDEX—MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip
00779	AMP, INC.	P O BOX 3608	HARRISBURG, PA 17105
00853	SANGAMO ELECTRIC CO., S. CAROLINA DIV.	P O BOX 128	PICKENS, SC 29671
01121	ALLEN-BRADLEY COMPANY	1201 2ND STREET SOUTH	MILWAUKEE, WI 53204
01295	TEXAS INSTRUMENTS, INC., SEMICONDUCTOR GROUP	P O BOX 5012, 13500 N CENTRAL EXPRESSWAY	DALLAS, TX 75222
04713	MOTOROLA, INC., SEMICONDUCTOR PROD. DIV.	5005 E MCDOWELL RD,PO BOX 20923	PHOENIX, AZ 85036
07263	FAIRCHILD SEMICONDUCTOR, A DIV. OF FAIRCHILD CAMERA AND INSTRUMENT CORP.	464 ELLIS STREET	MOUNTAIN VIEW, CA 94042
18324	SIGNETICS CORP.	811 E. ARQUES	SUNNYVALE, CA 94086
22526	BERG ELECTRONICS, INC.	YOUK EXPRESSWAY	NEW CUMBERLAND, PA 17070
27014	NATIONAL SEMICONDUCTOR CORP.	2900 SEMICONDUCTOR DR.	SANTA CLARA, CA 95051
32997	BOURNS, INC., TRIMPOT PRODUCTS DIV.	1200 COLUMBIA AVE.	RIVERSIDE, CA 92507
55680	NICHICON/AMERICA/CORP.	6435 N PROESEL AVENUE	CHICAGO, IL 60645
56289	SPRAGUE ELECTRIC CO.	87 MARSHALL ST.	NORTH ADAMS, MA 01247
72982	ERIE TECHNOLOGICAL PRODUCTS, INC.	644 W. 12TH ST.	ERIE, PA 16512
73138	BECKMAN INSTRUMENTS, INC., HELIPOT DIV.	2500 HARBOR BLVD.	FULLERTON, CA 92634
80009	TEKTRONIX, INC.	P O BOX 500	BEAVERTON, OR 97077
91418	RADIO MATERIALS COMPANY, DIV. OF P.R. MALLORY AND COMPANY, INC.	4242 W BRYN MAWR	CHICAGO, IL 60646
91637	DALE ELECTRONICS, INC.	P. O. BOX 609	COLUMBUS, NE 68601

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A43	670-7249-00			CKT BOARD ASSY:AUDIO DISCRIMINATOR	80009	670-7249-00
A43C00	290-0745-00			CAP.,FXD,ELCTLT:22UF,+50-10%,25V	56289	502D225
A43C05	283-0596-00			CAP.,FXD,MICA D:528PF,1%,300V	00853	D153F5280F0
A43C08	290-0782-00			CAP.,FXD,ELCTLT:4.7UF,+75-10%,35V	55680	35ULA4R7V-T
A43C12	290-0755-00			CAP.,FXD,ELCTLT:100UF,+50-10%,10V	56289	502D223
A43C20	290-0745-00			CAP.,FXD,ELCTLT:22UF,+50-10%,25V	56289	502D225
A43C25	290-0755-00			CAP.,FXD,ELCTLT:100UF,+50-10%,10V	56289	502D223
A43C26	290-0782-00			CAP.,FXD,ELCTLT:4.7UF,+75-10%,35V	55680	35ULA4R7V-T
A43C28	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	91418	SP103Z151-4R9
A43C35	283-0711-00			CAP.,FXD,MICA D:2700PF,2%,500V	00853	D195E272G0
A43C42	283-0695-00			CAP.,FXD,MICA D:4440PF,1%,300V	00853	D193F4441F0
A43C48	290-0782-00			CAP.,FXD,ELCTLT:4.7UF,+75-10%,35V	55680	35ULA4R7V-T
A43C52	283-0695-00			CAP.,FXD,MICA D:4440PF,1%,300V	00853	D193F4441F0
A43C54	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	91418	SP103Z151-4R9
A43C55	283-0203-00			CAP.,FXD,CER DI:0.47UF,20%,50V	72982	8131N075E474M
A43C56	283-0711-00			CAP.,FXD,MICA D:2700PF,2%,500V	00853	D195E272G0
A43C65	283-0695-00			CAP.,FXD,MICA D:4440PF,1%,300V	00853	D193F4441F0
A43C81	283-0024-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	72982	8121N083Z5U0104Z
A43C83	283-0632-00			CAP.,FXD,MICA D:87PF,1%,100V	00853	D151E870F0
A43C84	283-0024-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	72982	8121N083Z5U0104Z
A43C85	283-0623-00			CAP.,FXD,MICA D:1200PF,1%,100V	00853	D191F122F0
A43CR02	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A43CR16	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A43L33	120-0382-00			XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
A43L41	114-0409-00			COIL,RF:VAR,1.38-1.45MH	80009	114-0409-00
A43L43	120-0382-00			XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
A43L61	114-0409-00			COIL,RF:VAR,1.38-1.45MH	80009	114-0409-00
A43P65	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 PH BRZ GOLD	22526	47357
A43P242	131-1771-00			CONNECTOR,RCPT,:CIRCUIT CARD,6 FEMALE	22526	65001-111
A43Q08	151-0127-00			TRANSISTOR:SILICON,NPN	07263	S006075
A43Q13	151-0127-00			TRANSISTOR:SILICON,NPN	07263	S006075
A43Q14	151-0188-00			TRANSISTOR:SILICON,PNP	04713	SPS6868K
A43Q18	151-0301-00			TRANSISTOR:SILICON,PNP	27014	2N2907A
A43Q19	151-0301-00			TRANSISTOR:SILICON,PNP	27014	2N2907A
A43R01	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
A43R02	321-0182-00			RES.,FXD,FILM:768 OHM,1%,0.125W	91637	MFF1816G768R0F
A43R03	301-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.50W	01121	EB4715
A43R05	301-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.50W	01121	EB1025
A43R08	315-0751-00			RES.,FXD,CMPSN:750 OHM,5%,0.25W	01121	CB7515
A43R10	315-0751-00			RES.,FXD,CMPSN:750 OHM,5%,0.25W	01121	CB7515
A43R11	321-0226-00			RES.,FXD,FILM:2.21K OHM,1%,0.125W	91637	MFF1816G22100F
A43R16	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A43R17	315-0432-00			RES.,FXD,CMPSN:4.3K OHM,5%,0.25W	01121	CB4325
A43R18	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A43R21	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A43R22	321-0298-00			RES.,FXD,FILM:12.4K OHM,1%,0.125W	91637	MFF1816G12401F
A43R26	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A43R30	311-1241-00			RES.,VAR,NONWIR:100K OHM,10%,0.5W	32997	3386X-T07-104
A43R33	321-0256-00			RES.,FXD,FILM:4.53K OHM,1%,0.125W	91637	MFF1816G45300F
A43R34	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
A43R43	321-0201-00			RES.,FXD,FILM:1.21K OHM,1%,0.125W	91637	MFF1816G12100F
A43R44	321-0210-00			RES.,FXD,FILM:1.5K OHM,1%,0.125W	91637	MFF1816G15000F
A43R45	321-0345-00			RES.,FXD,FILM:38.3K OHM,1%,0.125W	91637	MFF1816G38301F
A43R46	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
A43R47	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
A43R55	315-0205-00			RES.,FXD,CMPSN:2M OHM,5%,0.25W	01121	CB2055
A43R63	321-0121-00			RES.,FXD,FILM:178 OHM,1%,0.125W	91637	MFF1816G178R0F

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A43R64	321-0085-00			RES.,FXD,FILM:75 OHM,1%,0.125W	91637	MFF1816G75R00F
A43R65	321-0289-00			RES.,FXD,FILM:10K OHM,1%,0.125W	91637	MFF1816G10001F
A43R67	321-0179-00			RES.,FXD,FILM:715 OHM,1%,0.125W	91637	MFF1816G715R0F
A43R71	311-1248-00			RES.,VAR,NONWIR:500 OHM,10%,0.50W	73138	72-23-0
A43R72	321-0267-00			RES.,FXD,FILM:5.9K OHM,1%,0.125W	91637	MFF1816G59000F
A43R81	311-1245-00			RES.,VAR,NONWIR:10K OHM,10%,0.50W	73138	72-28-0
A43R82	321-0267-00			RES.,FXD,FILM:5.9K OHM,1%,0.125W	91637	MFF1816G59000F
A43R83	321-0267-00			RES.,FXD,FILM:5.9K OHM,1%,0.125W	91637	MFF1816G59000F
A43R84	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A43R85	321-0251-00			RES.,FXD,FILM:4.02K OHM,1%,0.125W	91637	MFF1816G40200F
A43R87	321-0281-00			RES.,FXD,FILM:8.25K OHM,1%,0.125W	91637	MFF1816G82500F
A43R88	321-0179-00			RES.,FXD,FILM:715 OHM,1%,0.125W	91637	MFF1816G715R0F
A43R89	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
A43TP19	214-0579-00			TERM,TEST POINT:BRS CD PL	80009	214-0579-00
A43U58	156-0067-12			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	04713	MC1741CU
A43U84	156-1272-00			MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER	18324	NE5532 FE-IIB
A43U85	156-1272-00			MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER	18324	NE5532 FE-IIB
A43VR12	152-0195-00			SEMICOND DEVICE:ZENER,0.4W,5.1V,5%	04713	SZ11755
A43VR47	152-0168-00			SEMICOND DEVICE:ZENER,0.4W,12V,5%	04713	SZG35009K4
	131-0993-00			BUS,CONDUCTOR:2 WIRE BLACK	00779	530153-2

REPLACEABLE ELECTRICAL PARTS

PARTS ORDERING INFORMATION

Replacement parts are available from or through your local Tektronix, Inc. Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc. Field Office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

LIST OF ASSEMBLIES

A list of assemblies can be found at the beginning of the Electrical Parts List. The assemblies are listed in numerical order. When the complete component number of a part is known, this list will identify the assembly in which the part is located.

CROSS INDEX-MFR. CODE NUMBER TO MANUFACTURER

The Mfr. Code Number to Manufacturer index for the Electrical Parts List is located immediately after this page. The Cross Index provides codes, names and addresses of manufacturers of components listed in the Electrical Parts List.

ABBREVIATIONS

Abbreviations conform to American National Standard Y1.1.

COMPONENT NUMBER (column one of the Electrical Parts List)

A numbering method has been used to identify assemblies, subassemblies and parts. Examples of this numbering method and typical expansions are illustrated by the following:

Example a.

component number: A23R1234 = A23 (Assembly number) + R1234 (Circuit number)

Read: Resistor 1234 of Assembly 23

Example b.

component number: A23A2R1234 = A23 (Assembly number) + A2 (Subassembly number) + R1234 (Circuit number)

Read: Resistor 1234 of Subassembly 2 of Assembly 23

Only the circuit number will appear on the diagrams and circuit board illustrations. Each diagram and circuit board illustration is clearly marked with the assembly number. Assembly numbers are also marked on the mechanical exploded views located in the Mechanical Parts List. The component number is obtained by adding the assembly number prefix to the circuit number.

The Electrical Parts List is divided and arranged by assemblies in numerical sequence (e.g., assembly A1 with its subassemblies and parts, precedes assembly A2 with its subassemblies and parts).

Chassis-mounted parts have no assembly number prefix and are located at the end of the Electrical Parts List.

TEKTRONIX PART NO. (column two of the Electrical Parts List)

Indicates part number to be used when ordering replacement part from Tektronix.

SERIAL/MODEL NO. (columns three and four of the Electrical Parts List)

Column three (3) indicates the serial number at which the part was first used. Column four (4) indicates the serial number at which the part was removed. No serial number entered indicates part is good for all serial numbers.

NAME & DESCRIPTION (column five of the Electrical Parts List)

In the Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, the U.S. Federal Cataloging Handbook H6-1 can be utilized where possible.

MFR. CODE (column six of the Electrical Parts List)

Indicates the code number of the actual manufacturer of the part. (Code to name and address cross reference can be found immediately after this page.)

MFR. PART NUMBER (column seven of the Electrical Parts List)

Indicates actual manufacturers part number.

CROSS INDEX—MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip
00779	AMP, INC.	P.O. BOX 3608	HARRISBURG, PA 17105
00853	SANGAMO ELECTRIC CO., S. CAROLINA DIV.	P.O. BOX 128	PICKENS, SC 29671
01121	ALLEN-BRADLEY COMPANY	1201 2ND STREET SOUTH	MILWAUKEE, WI 53204
01295	TEXAS INSTRUMENTS, INC. SEMICONDUCTOR GROUP	P.O. BOX 5012	DALLAS, TX 75222
01686	RCL ELECTRONICS, INC.	195 MC GREGOR STREET	MANCHESTER, NH 03102
02111	SPECTROL ELECTRONICS CORPORATION	17070 EAST GALE AVENUE	CITY OF INDUSTRY, CA 91745
02735	RCA CORPORATION, SOLID STATE DIVISION	ROUTE 202	SOMERVILLE, NY 08876
02777	HOPKINS ENGINEERING COMPANY	12900 FOOTHILL BLVD.	SAN FERNANDO, CA 91342
03508	GENERAL ELECTRIC COMPANY, SEMI-CONDUCTOR PRODUCTS DEPARTMENT	ELECTRONICS PARK	SYRACUSE, NY 13201
04222	AVX CERAMICS, DIVISION OF AVX CORP.	P O BOX 867	MYRTLE BEACH, SC 29577
04713	MOTOROLA, INC., SEMICONDUCTOR PROD. DIV.	5005 E MCDOWELL RD,PO BOX 20923	PHOENIX, AZ 85036
07263	FAIRCHILD SEMICONDUCTOR, A DIV. OF FAIRCHILD CAMERA AND INSTRUMENT CORP.	464 ELLIS STREET	MOUNTAIN VIEW, CA 94042
09023	CORNELL-DUBILIER ELECTRONIC DIVISION FEDERAL PACIFIC ELECTRIC CO.	2652 DALRYMPLE ST.	SANFORD, NC 27330
12089	BEAV MOTOR DIVISION UMC ELECTRONICS CO.	460 SACKETT POINT RD.	NORTH HAVEN, CT 06473
12969	UNITRODE CORPORATION	580 PLEASANT STREET	WATERTOWN, MA 02172
14433	ITT SEMICONDUCTORS	3301 ELECTRONICS WAY P O BOX 3049	WEST PALM BEACH, FL 33402
14552	MICRO SEMICONDUCTOR CORP.	2830 E FAIRVIEW ST.	SANTA ANA, CA 92704
15238	ITT SEMICONDUCTORS, A DIVISION OF INTER NATIONAL TELEPHONE AND TELEGRAPH CORP.	P.O. BOX 168, 500 BROADWAY	LAWRENCE, MA 01841
15454	RODAN INDUSTRIES, INC.	2905 BLUE STAR ST.	ANAHEIM, CA 92806
15605	CUTLER-HAMMER, INC.	4201 27TH STREET	MILWAUKEE, WI 53216
17856	SILICONIX, INC.	2201 LAURELWOOD DRIVE	SANTA CLARA, CA 95054
19396	ILLINOIS TOOL WORKS, INC. PAKTRON DIV.	900 FOLLIN LANE, SE	VIENNA, VA 22180
22229	SOLITRON DEVICES, INC., SEMICONDUCTOR GROUP	8808 BALBOA AVENUE	SAN DIEGO OPERS, CA 92123
24546	CORNING GLASS WORKS, ELECTRONIC COMPONENTS DIVISION	550 HIGH STREET	BRADFORD, PA 16701
24931	SPECIALITY CONNECTOR CO., INC.	2620 ENDRESS PLACE	GREENWOOD, IN 46142
27014	NATIONAL SEMICONDUCTOR CORP.	2900 SEMICONDUCTOR DR.	SANTA CLARA, CA 95051
31781	EDAC INC.	20 RAILSIDE RD.	DON MILLS, ONT, CANADA M3A 1
32997	BOURNS, INC., TRIMPOT PRODUCTS DIV.	1200 COLUMBIA AVE.	RIVERSIDE, CA 92507
33095	SPECTRUM CONTROL, INC.	152 E MAIN STREET	FAIRVIEW, PA 16415
33096	COLORADO CRYSTAL CORPORATION	2303 W 8TH STREET	LOVELAND, CO 80537
34430	MONSANTO COMMERCIAL PRODUCT, CO. FABRICATOR PRODUCTS DIV.	BOX 3790, 611 EAST CERRITOS AVE.	ANAHEIM, CA 92803
50437	RELIANCE STEEL PRODUCTS COMPANY	3700 WALNUT STREET	MCKEESPORT, PA 15132
50522	MONSANTO CO., ELECTRONIC SPECIAL PRODUCTS	3400 HILLVIEW AVENUE	PALO ALTO, CA 94304
50579	LITRONIX INC.	19000 HOMESTEAD RD.	CUPERTINO, CA 95014
51642	CENTRE ENGINEERING INC.	2820 E COLLEGE AVENUE	STATE COLLEGE, PA 16801
51984	NEC AMERICA INC. RADIO AND TRANSMISSION DIV.	2990 TELESTAR CT. SUITE 212	FALLS CHURCH, VA 22042
54473	MATSUSHITA ELECTRIC, CORP. OF AMERICA	1 PANASONIC WAY	SECAUCUS, NJ 07094
54937	DEYOUNG MFG., INC.	PO BOX 1806, 1517 130TH AVE.	BELLEVUE, WA 98009
55680	NICHICON/AMERICA/CORP.	6435 N PROESEL AVENUE	CHICAGO, IL 60645
56289	SPRAGUE ELECTRIC CO.	87 MARSHALL ST.	NORTH ADAMS, MA 01247
57668	R-OHM CORP.	16931 MILLIKEN AVE.	IRVINE, CA 92713
58361	GENERAL INSTRUMENT CORP. OPTO ELECTRONICS DIV.	3400 HILLVIEW AVE	PALO ALTO, CA 94304
59660	TUSONIX INC.	2155 N FORBES BLVD	TUCSON, AZ 85705
59821	CENTRALAB INC SUB NORTH AMERICAN PHILIPS CORP	7158 MERCHANT AVE	EL PASO, TX 79915
71400	BUSSMAN MFG., DIVISION OF MCGRAW-EDISON CO.	2536 W. UNIVERSITY ST.	ST. LOUIS, MO 63107
71468	ITT CANNON ELECTRIC	666 E. DYER RD.	SANTA ANA, CA 92702
72982	ERIE TECHNOLOGICAL PRODUCTS, INC.	644 W. 12TH ST.	ERIE, PA 16512
73138	BECKMAN INSTRUMENTS, INC., HELIPOT DIV.	2500 HARBOR BLVD.	FULLERTON, CA 92634
74970	JOHNSON, E. F., CO.	299 10TH AVE. S. W.	WASECA, MN 56093
75042	TRW ELECTRONIC COMPONENTS, IRC FIXED RESISTORS, PHILADELPHIA DIVISION	401 N. BROAD ST.	PHILADELPHIA, PA 19108
75378	CTS KNIGHTS, INC.	400 REIMANN AVE.	SANDWICH, IL 60548
76493	BELL INDUSTRIES, INC., MILLER, J. W., DIV.	19070 REYES AVE., P O BOX 5825	COMPTON, CA 90224

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A1	119-0948-00			ATTENUATOR,VAR:0-30DB IN 10DB STEPS	80009	119-0948-00
A10	119-0813-00			SELECTOR,VOLTS:W/LINE FLTR RCPT & FUSE	02777	F65003
A20	670-5001-00	B000100	B010134	CKT BOARD ASSY:IF FILTER AMP	80009	670-5001-00
	----- -----			(1450 ONLY)		
A20	670-5001-02	B010135		CKT BOARD ASSSY:IF FILTER AMP	80009	670-5001-02
	----- -----			(1450,1450-1 OPT. 3)		
A20	670-5001-03			CKT BOARD ASSY:IF FILTER AMPL	80009	670-5001-03
	----- -----			(OPTION 1 ONLY)		
A20	670-5001-05			CKT BOARD ASSY:IF FILTER AMPL	80009	670-5001-05
	----- -----			(1450,1450-1 OPT. 2)		
A21	----- -----			CKT BOARD ASSY:IF ATTENUATORE/AMPLIFIER		
	----- -----			(PART OF A80,1450,1450-1 OPT. 3)		
A22	----- -----			CKT BOARD ASSY:IF MIXER		
	----- -----			(PART OF A82)		
	----- -----			1450,1450-1 OPT. 3)		
A22	----- -----			CKT BOARD ASSY:IF MIXER (OPT 1 & 2		
	----- -----			PART OF A82)		
A23	670-5003-00	B000100	B010488	CKT BOARD ASSY:IF SWITCH AURAL DRIVE	80009	670-5003-00
A23	670-5003-01	B010489		CKT BOARD ASSY:IF SWITCH AURAL DRIVE	80009	670-5003-01
A24	670-5004-01	B000100	B010774	CKT BOARD ASSY:IF SAW AMP	80009	670-5004-01
A24	670-5004-07	B010775		CKT BOARD ASSY:IF SAW AMP	80009	670-5004-07
A25	670-5004-00	B000100	B010774	CKT BOARD ASSY:IF SAW AMP	80009	670-5004-00
A25	670-5004-06	B010775		CKT BOARD ASSY:IF SAW AMP	80009	670-5004-06
A26	670-5005-00			CKT BOARD ASSY:IF POST AMP	80009	670-5005-00
A26	----- -----			(1450 ONLY)		
A26	670-5005-00	B010380	B011036	CKT BOARD ASSY:IF POST AMP	80009	670-5005-00
A26	----- -----			(1450-1 ONLY)		
A26	670-6667-01	B011037	B011202	CKT BOARD ASSY:IF POST AMP	80009	670-6667-01
A26	670-6667-02	B011203		CKT BOARD ASSY:IF POST AMP	80009	670-6667-02
A27	670-5008-00			CKT BOARD ASSY:IF ZERO CARRIER/PH SHIFTER	80009	670-5008-00
A28	670-5009-00	B000100	B010949	CKT BOARD ASSY:IF DET/VIDEO AMP	80009	670-5009-00
A28	670-5009-02	B010950		CKT BOARD ASSY:IF DET/VIDEO AMP	80009	670-5009-02
A29	670-5009-00	B000100	B010949	CKT BOARD ASSY:IF DET/VIDEO AMP	80009	670-5009-00
A29	670-5009-02	B010950		CKT BOARD ASSY:IF DET/VIDEO AMP	80009	670-5009-02
A30	----- -----			CKT BOARD ASSY:PIN DRIVER/IF ATTEN AMP		
A30	----- -----			(PART OF A80,1450,1450-1 OPT 3 ONLY)		
A30	----- -----			CKT BOARD ASSY:PIN DRIVER/IF ATTEN/MIXER		
A30	----- -----			(PART OF A82,OPT 1 & 2 ONLY)		
A30	----- -----			CKT BOARD ASSY:PIN DRIVER/IF ATTEN/MIXER		
A30	----- -----			(PART OF A82)		
A30	----- -----			1450,1450-1 OPT. 3 ONLY)		
A31	----- -----			CKT BOARD ASSY:PIN DRIVER/IF ATTEN/MIXER		
A31	----- -----			(PART OF A82,OPT 1 & 2)		
A31	----- -----			CKT BOARD ASSY:PIN DRIVER/IF ATTEN AMP		
A31	----- -----			(PART OF A80)		
A31	----- -----			CKT BOARD ASSY:PIN DRIVER/IF ATTEN/MIXER		
A31	----- -----			(PART OF A82 1450,1450-1 OPT 3 ONLY)		
A32	670-5010-00	B000100	B010653	CKT BOARD ASSY:IF INTERFACE	80009	670-5010-00
A32	670-5010-01	B010654		CKT BOARD ASSY:IF INTERFACE	80009	670-5010-01
A40	670-5011-00			CKT BOARD ASSY:1ST AUDIO MIXER	80009	670-5011-00
A41	670-5012-00	B000100	B011036	CKT BOARD ASSY:2ND AUDIO MIXER	80009	670-5012-00
A41	670-5012-03	B011037		CKT BOARD ASSY:2ND AUDIO MIXER	80009	670-5012-03
A42	670-5013-00			CKT BOARD ASSY:AUDIO LIMITER	80009	670-5013-00

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A43	670-5014-00	B000100	B010383	CKT BOARD ASSY:AUDIO DESCRIMINATOR	80009	670-5014-00
A43	670-6024-01	B010384		CKT BOARD ASSY:AUDIO DISCRIMINATOR	80009	670-6024-01
A44	670-5015-01	B000100	B010187	CKT BOARD ASSY:AUDIO INTERFACE	80009	670-5015-01
A44	670-5015-02	B010188		CKT BOARD ASSY:AUDIO INTERFACE	80009	670-5015-02
A50	670-5016-00			CKT BOARD ASSY:REFERENCE CONTROL	80009	670-5016-00
A51	670-5018-00			CKT BOARD ASSY:REFERENCE OSCILLATOR	80009	670-5018-00
A52	670-5017-00			CKT BOARD ASSY:PHASE SHIFTER	80009	670-5017-00
A53	670-5019-00			CKT BOARD ASSY:CONVERTER PHASE LOCK	80009	670-5019-00
A54	670-5020-00			CKT BOARD ASSY:DETECTOR LO SWITCH	80009	670-5020-00
A55	670-5007-00			CKT BOARD ASSY:IF LIMITER	80009	670-5007-00
A56	670-5194-00			CKT BOARD ASSY:CONVERTER CONTROL	80009	670-5194-00
	----- -----			(1450,1450-1 OPT. 3 ONLY)		
A56	670-5194-01			CKT BOARD ASSY:CONVERTER CONTROL	80009	670-5194-01
	----- -----			(OPTION 1 ONLY)		
A56	670-5194-02			CKT BOARD ASSY:CONVERTER CONTROL	80009	670-5194-02
	----- -----			(OPTION 2 ONLY)		
A57	670-5196-00	B000100	B010119	CKT BOARD ASSY:CONVERTER OSCILLATOR	80009	670-5196-00
	----- -----			(1450 ONLY)		
A57	670-5196-01	B000100	B000119	CKT BOARD ASSY:CONVERTER OSC	80009	670-5196-01
	----- -----			(OPTION 1 & 2 ONLY)		
A57	670-5196-03	B010120		CKT BOARD ASSY:CONVERTER OSC	80009	670-5196-03
	----- -----			(OPTION 1 & 2 ONLY)		
A57	670-5196-02	B010120		CKT BOARD ASSY:CONVERTER OSC	80009	670-5196-02
	----- -----			(1450, 1450-1 OPTION 3 ONLY)		
A58	670-5195-00			CKT BOARD ASSY:PHASE LOCK SWITCH	80009	670-5195-00
A59	670-5021-00	B000100	B01118	CKT BOARD ASSY:PHASE LOCK INTERFACE	80009	670-5021-00
A59	670-5021-01	B011188		CKT BOARD ASSY:PHASE LOCK INTERFACE	80009	670-5021-01
A60	670-5022-00	B000100	B010213	CKT BOARD ASSY:AGC LOGIC INTERFACE	80009	670-5022-00
A60	670-5022-01	B010214		CKT BOARD ASSY:AGC LOGIC INTERFACE	80009	670-5022-01
A61	670-5023-00	B000100	B010997	CKT BOARD ASSY:READOUT DRIVER	80009	670-5023-00
A61	670-5023-01	B010998		CKT BOARD ASSY:READOUT DRIVER	80009	670-5023-01
A62	670-5024-00			CKT BOARD ASSY:READOUT	80009	670-5024-00
A70	670-4987-00			CKT BOARD ASSY:POWER SUPPLY	80009	670-4987-00
A80	672-0638-00	B000100	B010684	CKT BOARD ASSY:PIN DRIVER/IF ATTEN AMP	80009	672-0638-00
A80	672-0638-01	B010685		CKT BOARD ASSY:PIN DRIVER/IF ATTEN AMPL	80009	672-0638-01
A82	672-0639-00	B000100	B010644	CKT BOARD ASSY:PIN DRIVER/IF ATTEN/MIXER	80009	672-0639-00
A82	672-0639-03	B010645	B011039	CKT BOARD ASSY:PIN DIRVER/IF ATTEN/MIXER	80009	672-0639-03
A82	----- -----			(1450-1 OPTION 3 ONLY)		
A82	672-0639-06	B011040		CKT BOARD ASSY:PIN DIRVER/IF ATTEN/MIXER	80009	672-0639-06
A82	----- -----			(1450-1 OPTION 3 ONLY)		
A82	672-0639-01	B000100	B010644	CKT BOARD ASSY:PIN DRIVER/IF ATTEN/MIXER	80009	672-0639-01
A82	----- -----			(1450-1 OPTION 1 & 2 ONLY)		
A82	672-0639-04	B010645	B011039	CKT BOARD ASSY:PIN DRIVER/IF ATTEN/MIXER	80009	672-0639-04
A82	----- -----			(1450-1 OPTION 1 & 2 ONLY)		
A82	672-0639-07	B011040		CKT BOARD ASSY:PIN DRIVER/IF ATTEN/MIXER	80009	672-0639-07
	----- -----			(1450-1 OPTION 1 & 2 ONLY)		

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A20	670-5001-00	B000100	B010134	CKT BOARD ASSY:IF FILTER AMP	80009	670-5001-00
A20	----- -----			(1450 ONLY)		
A20	670-5001-02	B010135		CKT BOARD ASSSY:IF FILTER AMP	80009	670-5001-02
A20	----- -----			(1450,1450-1 OPT. 3)		
A20	670-5001-03			CKT BOARD ASSY:IF FILTER AMPL	80009	670-5001-03
	----- -----			(OPTION 1 ONLY)		
A20C05	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A20C13	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A20C14	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A20C15	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A20C19	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A20C20	283-0642-00	B000100	B010346	CAP.,FXD,MICA D:33PF,+/-0.5PF,300V	00853	D10-5E330G
A20C20	----- -----			(1450 ONLY)		
A20C20	283-0600-00	B010347		CAP.,FXD,MICA D:43PF,5%,500V	00853	D105E430J0
A20C20	----- -----			(1450, 1450-1 OPT. 3)		
A20C20	283-0633-00			CAP.,FXD,MICA D:77PF,1%,100V	00853	D155E770F0
A20C20	----- -----			(OPTION 1 & 2)		
A20C25	283-0643-00	B000100	B010346	CAP.,FXD,MICA D:22PF,+/-0.5PF,300V	00853	D105E220D0
A20C25	----- -----			(1450 ONLY)		
A20C25	283-0638-00	B010347		CAP.,FXD,MICA D:130PF,1%,100V	00853	D151F131F0
A20C25	----- -----			(1450, 1450-1 OPT. 3)		
A20C25	283-0603-00	B010120	B010134	CAP.,FXD,MICA D:113PF,2%,300V	00853	D155F1130G0
A20C25	----- -----			(OPTION 1 ONLY)		
A20C25	283-0647-00	B010135	B010193	CAP.,FXD,MICA D:70PF,1%,100V	00853	D155E700F0
A20C25	----- -----			(OPTION 1 ONLY)		
A20C25	283-0635-00	B010194		CAP.,FXD,MICA D:51PF,1%,100V	00853	D151E510F0
A20C25	----- -----			(OPTION 1 ONLY)		
A20C25	283-0647-00			CAP.,FXD,MICA D:70PF,1%,100V	00853	D155E700F0
A20C25	----- -----			(OPTION 2 ONLY)		
A20C26	281-0549-00	B000100	B010346	CAP.,FXD,CER DI:68PF,10%,500V	59660	301-000U2J0680K
A20C26	----- -----			(1450 ONLY)		
A20C26	281-0549-00	B010135		CAP.,FXD,CER DI:68PF,10%,500V	59660	301-000U2J0680K
A20C26	----- -----			(OPTION 1 ONLY)		
A20C26	281-0562-00			CAP.,FXD,CER DI:39PF,10%,500V	59660	301-000U2J0390K
A20C26	----- -----			(OPTION 2 ONLY)		
A20C28	283-0407-00	B010120		CAP.,FXD,CER DI:27PF,5%,50V	72982	A01AL4A2LC1G270J
A20C28	----- -----			(OPTION 1 ONLY)		
A20C28	283-0407-00			CAP.,FXD,CER DI:27PF,5%,50V	72982	A01AL4A2LC1G270J
A20C28	----- -----			(OPTION 2 ONLY)		
A20C29	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A20C35	281-0160-00	B000100	B010346	CAP.,VAR,CER DI:7-25PF,350V	59660	538-011B7-25
A20C35	----- -----			(1450 ONLY)		
A20C35	281-0167-00	B010347		CAP.,VAR,CER DI:9-45PF,200V	59660	538-011D9-45
A20C35	----- -----			(1450, 1450-1 OPT. 3 ONLY)		
A20C35	281-0167-00			CAP.,VAR,CER DI:9-45PF,200V	59660	538-011D9-45
A20C35	----- -----			(OPTION 1 AND 2 ONLY)		
A20C36	283-0642-00	B000100	B010346	CAP.,FXD,MICA D:33PF,+/-0.5PF,300V	00853	D10-5E330G
A20C36	----- -----			(1450 ONLY)		
A20C36	283-0600-00	B010347		CAP.,FXD,MICA D:43PF,5%,500V	00853	D105E430J0
A20C36	----- -----			(1450, 1450-1 OPT. 3 ONLY)		
A20C36	283-0639-00	B000100	B010134	CAP.,FXD,MICA D:56PF,1%,100V	00853	D151E560F0
A20C36	----- -----			(OPTION 1 ONLY)		
A20C36	283-0663-00	B010135		CAP.,FXD,MICA D:16.8PF,+/-0.5PF,500V	00853	D155C16R8D0
A20C36	----- -----			(OPTION 1 ONLY)		

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A20C36	283-0070-00			CAP.,FXD,CER DI:30PF,10%,50V	72982	8121-060C0G0300K
A20C36	----- -----			(OPTION 2 ONLY)		
A20C37	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A20C37	----- -----			(1450 OPT. 2, 1450-1 OPT. 2 & 3)		
A20C37	281-0562-00	B010135		CAP.,FXD,CER DI:39PF,10%,500V	59660	301-000U2J0390K
A20C37	----- -----			(OPTION 1 ONLY)		
A20C38	281-0564-00			CAP.,FXD,CER DI:24PF,5%,500V	59660	301-000C0G0240J
A20C38	----- -----			(OPTION 2 ONLY)		
A20C45	283-0640-00	B010135		CAP.,FXD,MICA D:160PF,1%,100V	00853	D155F161F0
A20C45	----- -----			(OPTION 1 ONLY)		
A20C45	283-0640-00			CAP.,FXD,MICA D:160PF,1%,100V	00853	D155F161F0
A20C45	----- -----			(OPTION 2 ONLY)		
A20C45	283-0638-00	B010347		CAP.,FXD,MICA D:130PF,1%,100V	00853	D151F131F0
A20C45	----- -----			(1450, 1450-1 OPT. 3 ONLY)		
A20C53	281-0562-00	B010135		CAP.,FXD,CER DI:39PF,10%,500V	59660	301-000U2J0390K
A20C53	----- -----			(OPTION 1 ONLY)		
A20C53	281-0564-00			CAP.,FXD,CER DI:24PF,5%,500V	59660	301-000C0G0240J
A20C53	----- -----			(OPTION 2 ONLY)		
A20C54	283-0642-00	B000100	B010346	CAP.,FXD,MICA D:33PF,+/-0.5PF,300V	00853	D10-5E330G
A20C54	----- -----			(1450 ONLY)		
A20C54	283-0600-00	B010347		CAP.,FXD,MICA D:43PF,5%,500V	00853	D105E430J0
A20C54	----- -----			(1450, 1450-1 OPT. 3)		
A20C54	283-0639-00	B000100	B010134	CAP.,FXD,MICA D:56PF,1%,100V	00853	D151E560F0
A20C54	----- -----			(OPTION 1 ONLY)		
A20C54	283-0663-00	B010135		CAP.,FXD,MICA D:16.8PF,+/-0.5PF,500V	00853	D155C16R8D0
A20C54	----- -----			(OPTION 1 ONLY)		
A20C54	283-0070-00			CAP.,FXD,CER DI:30PF,10%,50V	72982	8121-060C0G0300K
A20C54	----- -----			(OPTION 2 ONLY)		
A20C55	281-0160-00	B000100	B010346	CAP.,VAR,CER DI:7-25PF,350V	59660	538-011B7-25
A20C55	----- -----			(1450 ONLY)		
A20C55	281-0167-00	B010347		CAP.,VAR,CER DI:9-45PF,200V	59660	538-011D9-45
A20C55	----- -----			(1450, 1450-1 OPT. 3)		
A20C55	281-0167-00			CAP.,VAR,CER DI:9-45PF,200V	59660	538-011D9-45
A20C55	----- -----			(OPTION 1 & 2)		
A20C58	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A20C59	290-0804-00			CAP.,FXD,ELCTLT:10UF,+50-10%,25V	55680	ULA1E100TEA
A20C65	283-0631-00	B000100	B010346	CAP.,FXD,MICA D:95PF,1%,500V	00853	D155F950F0
A20C65	----- -----			(1450 ONLY)		
A20C65	283-0649-00	B010347	B011036	CAP.,FXD,MICA D:105PF,1%,300V	00853	D155F1050F0
A20C65	----- -----			(1450, 1450-1 OPT. 3 ONLY)		
A20C65	283-0638-00	B011037		CAP.,FXD,MICA D:130PF,1%,100V	00853	D151F131F0
A20C65	----- -----			(1450, 1450-1 OPT. 3 ONLY)		
A20C65	283-0603-00	B010120	B010134	CAP.,FXD,MICA D:113PF,2%,300V	00853	D155F1130G0
A20C65	----- -----			(OPTION 1 ONLY)		
A20C65	283-0638-00	B010135	B010193	CAP.,FXD,MICA D:130PF,1%,100V	00853	D151F131F0
A20C65	----- -----			(OPTION 1 ONLY)		
A20C65	283-0649-00	B010194	B011036	CAP.,FXD,MICA D:105PF,1%,300V	00853	D155F1050F0
A20C65	----- -----			(OPTION 1 ONLY)		
A20C65	283-0638-00	B011037		CAP.,FXD,MICA D:130PF,1%,100V	00853	D151F131F0
A20C65	----- -----			(OPTION 1 ONLY)		
A20C65	283-0649-00			CAP.,FXD,MICA D:105PF,1%,300V	00853	D155F1050F0
A20C65	----- -----			(OPTION 2 ONLY)		
A20C65	283-0638-00	B011037		CAP.,FXD,MICA D:130PF,1%,100V	00853	D151F131F0
A20C65	----- -----			(OPTION 2 ONLY)		

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A20C66	283-0642-00	B000100	B010346	CAP.,FXD,MICA D:33PF,+/-0.5PF,300V	00853	D10-5E330G
A20C66	----- -----			(1450 ONLY)		
A20C66	283-0600-00	B010347		CAP.,FXD,MICA D:43PF,5%,500V	00853	D105E430J0
A20C66	----- -----			(1450, 1450-1 OPT. 3)		
A20C66	283-0639-00			CAP.,FXD,MICA D:56PF,1%,100V	00853	D151E560F0
A20C66	----- -----			(OPTION 1 & 2)		
A20C72	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A20C79	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A20C82	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A20C83	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A20C84	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A20C86	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A20C87	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A20L02	108-0509-00	B000100	B010346	COIL,RF:2.45UH	80009	108-0509-00
A20L02	108-0538-00	B010347		COIL,RF:FIXED,2.7UH	76493	JWM#B7059
A20L22	114-0266-00	B000100	B010134	COIL,RF:VARIABLE,400-800NH	80009	114-0266-00
A20L22	----- -----			(1450.)		
A20L22	114-0333-00	B010135		COIL,RF:310-600NH,CORE 276-0506-00	80009	114-0333-00
A20L22	----- -----			(1450,1450-1 OPT 3)		
A20L22	114-0266-00	B000100	B010134	COIL,RF:VARIABLE,400-800NH	80009	114-0266-00
A20L22	----- -----			(OPTION 1 ONLY)		
A20L22	114-0333-00	B010135		COIL,RF:310-600NH,CORE 276-0506-00	80009	114-0333-00
A20L22	----- -----			(OPTION 1 ONLY)		
A20L22	114-0333-00			COIL,RF:310-600NH,CORE 276-0506-00	80009	114-0333-00
A20L22	----- -----			(OPTION 2 ONLY)		
A20L26	108-0260-00			COIL,RF:98NH	80009	108-0260-00
A20L32	114-0333-00	B000100	B010134	COIL,RF:310-600NH,CORE 276-0506-00	80009	114-0333-00
A20L32	114-0352-00	B010135		COIL,RF:VARIABLE,220 TO 400NH	80009	114-0352-00
A20L45	114-0352-00	B000100	B000119	COIL,RF:VARIABLE,220 TO 400NH	80009	114-0352-00
A20L45	----- -----			(1450 ONLY)		
A20L45	114-0274-00	B010120	B010346	COIL,RF:	80009	114-0274-00
A20L45	----- -----			(1450 ONLY)		
A20L45	114-0302-00	B010347		COIL,RF:VARIABLE,140-290NH	80009	114-0302-00
A20L45	----- -----			(1450, 1450-1 OPT. 3)		
A20L45	114-0371-00	B000100	B010134	COIL,RF:VARIABLE,100 TO 160NH	80009	114-0371-00
A20L45	----- -----			(OPTION 1 ONLY)		
A20L45	114-0352-00	B010135		COIL,RF:VARIABLE,220 TO 400NH	80009	114-0352-00
A20L45	----- -----			(OPTION 1 ONLY)		
A20L45	114-0352-00			COIL,RF:VARIABLE,220 TO 400NH	80009	114-0352-00
A20L45	----- -----			(OPTION 2 ONLY)		
A20L52	114-0333-00			COIL,RF:310-600NH,CORE 276-0506-00	80009	114-0333-00
A20L62	114-0266-00	B000100	B010134	COIL,RF:VARIABLE,400-800NH	80009	114-0266-00
A20L62	----- -----			(1450.)		
A20L62	114-0333-00	B010135		COIL,RF:310-600NH,CORE 276-0506-00	80009	114-0333-00
A20L62	----- -----			(1450, 1450-1 OPT. 3)		
A20L62	114-0266-00	B000100	B010134	COIL,RF:VARIABLE,400-800NH	80009	114-0266-00
A20L62	----- -----			(OPTION 1 ONLY)		
A20L62	114-0333-00	B010135		COIL,RF:310-600NH,CORE 276-0506-00	80009	114-0333-00
A20L62	----- -----			(OPTION 1 ONLY)		
A20L62	114-0333-00			COIL,RF:310-600NH,CORE 276-0506-00	80009	114-0333-00
A20L62	----- -----			(OPTION 2 ONLY)		
A20L99	108-0509-00	B000100	B010346	COIL,RF:2.45UH	80009	108-0509-00
A20L99	108-0538-00	B010347		COIL,RF:FIXED,2.7UH	76493	JWM#B7059
A20LR13	108-0212-00			COIL,RF:FIXED,495NH	80009	108-0212-00

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A20LR86	108-0212-00			COIL,RF:FIXED,495NH	80009	108-0212-00
A20Q04	151-0472-00	B000100	B010346	TRANSISTOR:SILICON,NPN	51984	NE41632B
A20Q04	----- -----			(1450 OPT. 1)		
A20Q04	151-0451-00	B010347		TRANSISTOR:SILICON,NPN	04713	SRF503
A20Q04	----- -----			(1450, 1450-1 OPT. 1 & 3)		
A20Q04	151-0451-00			TRANSISTOR:SILICON,NPN	04713	SRF503
A20Q04	----- -----			(OPTION 2 ONLY)		
A20Q16	151-0650-00			TRANSISTOR:SILICON,NPN	80009	151-0650-00
A20Q47	151-0195-00			TRANSISTOR:SILICON,NPN	80009	151-0195-00
A20Q72	151-0650-00			TRANSISTOR:SILICON,NPN	80009	151-0650-00
A20Q85	151-0472-00	B000100	B010346	TRANSISTOR:SILICON,NPN	51984	NE41632B
A20Q85	----- -----			(1450 OPT. 1 ONLY)		
A20Q85	151-0451-00	B010347		TRANSISTOR:SILICON,NPN	04713	SRF503
A20Q85	----- -----			(1450 OPT. 1,1450-1 OPT. 1 & 3)		
A20Q85	151-0451-00			TRANSISTOR:SILICON,NPN	04713	SRF503
A20Q85	----- -----			(OPTION 2 ONLY)		
A20R02	321-0136-00			RES.,FXD,FILM:255 OHM,1%,0.125W	91637	MFF1816G255R0F
A20R03	321-0155-00			RES.,FXD,FILM:402 OHM,1%,0.125W	91637	MFF1816G402R0F
A20R06	321-0080-00			RES.,FXD,FILM:66.5 OHM,1%,0.125W	91637	MFF1816G66R50F
A20R07	321-0068-00	B000100	B010199	RES.,FXD,FILM:49.9 OHM,1%,0.125W	91637	MFF1816G49R90F
A20R07	----- -----	B010200		TEST SELECTED		
A20R07	----- -----			TEST SELECTED (OPTION 2 ONLY)		
A20R08	315-0241-00			RES.,FXD,CMPSN:240 OHM,5%,0.25W	01121	CB2415
A20R14	315-0200-00			RES.,FXD,CMPSN:20 OHM,5%,0.25W	01121	CB2005
A20R15	315-0200-00			RES.,FXD,CMPSN:20 OHM,5%,0.25W	01121	CB2005
A20R26	321-0097-00			RES.,FXD,FILM:100 OHM,1%,0.125W	91637	MFF1816G100R0F
A20R28	317-0510-00			RES.,FXD,CMPSN:51 OHM,5%,0.125W	01121	BB5105
A20R28	----- -----			(1450 OPT. 1,1450-1 OPT. 1 & 3)		
A20R28	317-0510-00	B010120		RES.,FXD,CMPSN:51 OHM,5%,0.125W	01121	BB5105
A20R28	----- -----			(OPTION 2 ONLY)		
A20R36	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
A20R48	321-0308-00			RES.,FXD,FILM:15.8K OHM,1%,0.125W	91637	MFF1816G15801F
A20R49	321-0358-00			RES.,FXD,FILM:52.3K OHM,1%,0.125W	91637	MFF1816G52301F
A20R57	315-0472-00	B000100	B010134	RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A20R57	----- -----			(OPTION 1 ONLY)		
A20R57	315-0102-00	B010135		RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A20R57	----- -----			(OPTION 1 ONLY)		
A20R57	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A20R57	----- -----			(OPTION 2 ONLY)		
A20R57	315-0472-00	B000100	B000104	RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A20R57	----- -----			(1450 ONLY)		
A20R57	315-0102-00	B000105		RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A20R57	----- -----			(1450, 1450-1 OPT. 3)		
A20R66	321-0136-00			RES.,FXD,FILM:255 OHM,1%,0.125W	91637	MFF1816G255R0F
A20R71	321-0136-00			RES.,FXD,FILM:255 OHM,1%,0.125W	91637	MFF1816G255R0F
A20R73	321-0030-00			RES.,FXD,FILM:20 OHM,1%,0.125W	91637	MFF1816G20R00F
A20R74	321-0097-00			RES.,FXD,FILM:100 OHM,1%,0.125W	91637	MFF1816G100R0F
A20R75	315-0200-00			RES.,FXD,CMPSN:20 OHM,5%,0.25W	01121	CB2005
A20R76	315-0200-00			RES.,FXD,CMPSN:20 OHM,5%,0.25W	01121	CB2005
A20R83	321-0068-00			RES.,FXD,FILM:49.9 OHM,1%,0.125W	91637	MFF1816G49R90F
A20R85	321-0080-00			RES.,FXD,FILM:66.5 OHM,1%,0.125W	91637	MFF1816G66R50F
A20R92	315-0241-00			RES.,FXD,CMPSN:240 OHM,5%,0.25W	01121	CB2415
A20R98	321-0155-00			RES.,FXD,FILM:402 OHM,1%,0.125W	91637	MFF1816G402R0F
A20R99	321-0136-00			RES.,FXD,FILM:255 OHM,1%,0.125W	91637	MFF1816G255R0F

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A20RT12	307-0250-00			RES.,THERMAL:390 OHM,10%	15454	DG125390K
A20RT97	307-0250-00			RES.,THERMAL:390 OHM,10%	15454	DG125390K
A20T11	120-1159-00			XFMR,RF:TOROID,7 T,TRIFILAR	80009	120-1159-00
A20T18	120-1158-00			XFMR,RF:BALUN ON 276-0712-00,TD-357	80009	120-1158-00
A20T72	120-1158-00			XFMR,RF:BALUN ON 276-0712-00,TD-357	80009	120-1158-00
A20T89	120-1159-00			XFMR,RF:TOROID,7 T,TRIFILAR	80009	120-1159-00

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A21	----- -----			CKT BOARD ASSY:IF ATTENUATOR/AMP		
A21	----- -----			(PART OF A80,1450,1450-1 OPT. 3)		
A21C10	283-0111-00	B000100	B010361	CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A21C13	283-0003-00	B010120	B010214	CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
A21C13	283-0111-00	B010362		CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A21C15	283-0203-00	B010120	B010214	CAP.,FXD,CER DI:0.47UF,20%,50V	04222	5R305SE474MAA
A21C28	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A21C29	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A21C31	281-0613-00	B000100	B000119	CAP.,FXD,CER DI:10PF,+/-1PF,200V	59660	374018C0G0100
A21C34	281-0613-00	B010120		CAP.,FXD,CER DI:10PF,+/-1PF,200V	59660	374018C0G0100
A21C36	283-0067-00	B000100	B000119	CAP.,FXD,CER DI:0.001UF,10%,200V	59660	835-515-Z5D0102K
A21C37	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A21C40	283-0111-00	B000100	B000119	CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A21C41	283-0032-00	B000100	B000119	CAP.,FXD,CER DI:470PF,5%,500V	59660	0831085Z5E00471J
A21C43	283-0067-00	B010120		CAP.,FXD,CER DI:0.001UF,10%,200V	59660	835-515-Z5D0102K
A21C44	283-0111-00	B010120		CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A21C51	283-0111-00	B010120		CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A21C52	283-0111-00	B000100	B000119	CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A21C52	283-0111-00	B010120		CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A21C54	283-0111-00	B000100	B000119	CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A21C55	281-0658-00	B000100	B000119	CAP.,FXD,CER DI:6.2PF,+/-0.25PF,500V	59660	301-000C0H0629C
A21C57	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A21C58	290-0782-00			CAP.,FXD,ELCTLT:4.7UF,+75-10%,35V	55680	ULA1V4R7TEA
A21C59	290-0782-00			CAP.,FXD,ELCTLT:4.7UF,+75-10%,35V	55680	ULA1V4R7TEA
A21C65	281-0658-00	B010120		CAP.,FXD,CER DI:6.2PF,+/-0.25PF,500V	59660	301-000C0H0629C
A21C66	283-0203-00	B000100	B000119	CAP.,FXD,CER DI:0.47UF,20%,50V	04222	5R305SE474MAA
A21C66	283-0032-00	B010120		CAP.,FXD,CER DI:470PF,5%,500V	59660	0831085Z5E00471J
A21C67	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A21C68	283-0203-00	B000100	B000119	CAP.,FXD,CER DI:0.47UF,20%,50V	04222	5R305SE474MAA
A21C68	283-0203-00	B010120		CAP.,FXD,CER DI:0.47UF,20%,50V	04222	5R305SE474MAA
A21C72	281-0592-00	B000100	B000119	CAP.,FXD,CER DI:4.7PF,+/-0.5PF,500V	59660	0301080COH0479 D
A21C72	283-0663-00	B010120		CAP.,FXD,MICA D:16.8PF,+/-0.5PF,500V	00853	D155C16R8D0
A21C73	283-0203-00	B010120		CAP.,FXD,CER DI:0.47UF,20%,50V	04222	5R305SE474MAA
A21C74	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A21C76	283-0111-00	B010120		CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A21C77	283-0111-00	B000100	B000119	CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A21C85	281-0577-00			CAP.,FXD,CER DI:14PF,5%,500V	04222	7001-COG-140J
A21C86	283-0111-00	B010120		CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A21C87	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A21C89	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A21C95	283-0111-00	B010120		CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A21C97	283-0111-00	B010120		CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A21C98	283-0111-00	B010120		CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A21CR14	152-0141-02	B000100	B010213	SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A21CR76	----- -----	B000100	B000119	(PART OF A80)		
A21CR77	----- -----	B000100	B000119	(PART OF A80)		
A21CR86	----- -----			(PART OF A80)		
A21CR96	----- -----	B010120		(PART OF A80)		
A21CR98	----- -----	B010120		(PART OF A80)		
A21E42	276-0543-00			SHLD BEAD,ELEK:FERRITE	80009	276-0543-00
A21L75	120-0382-00			XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
A21L76	120-0382-00			XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
A21L98	120-0382-00			XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
A21Q05	151-0219-00	B000100	B010214	TRANSISTOR:SILICON,PNP	07263	S022650

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A21Q07	151-0192-00	B000100	B010214	TRANSISTOR:SILICON,NPN,SEL FROM MPS652	04713	SPS8801
A21Q31	151-0451-00			TRANSISTOR:SILICON,NPN	04713	SRF503
A21Q42	151-0438-00			TRANSISTOR:SILICON,PNP,SEL FROM SPS692	80009	151-0438-00
A21Q62	151-0223-00			TRANSISTOR:SILICON,NPN	04713	SPS8026
A21Q75	151-0472-00			TRANSISTOR:SILICON,NPN	51984	NE41632B
A21R01	311-1237-00	B010120	B010214	RES.,VAR,NONWIR:1K OHM,10%,0.50W	32997	3386X-T07-102
A21R02	315-0271-00	B010120	B010214	RES.,FXD,CMPSN:270 OHM,5%,0.25W	01121	CB2715
A21R03	315-0103-00	B010120	B010214	RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A21R04	315-0203-00	B010120	B010214	RES.,FXD,CMPSN:20K OHM,5%,0.25W	01121	CB2035
A21R06	315-0104-00	B010120	B010214	RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
A21R07	315-0103-00	B010120	B010214	RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A21R12	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
A21R14	315-0335-00	B010120	B010214	RES.,FXD,CMPSN:3.3M OHM,5%,0.25W	01121	CB3355
A21R17	315-0102-00	B010120	B010214	RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A21R18	315-0512-00	B010120	B010214	RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
A21R21	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
A21R26	305-0271-00			RES.,FXD,CMPSN:270 OHM,5%,2W	01121	HB2715
A21R27	321-0068-00	B010120		RES.,FXD,FILM:49.9 OHM,1%,0.125W	91637	MFF1816G49R90F
A21R31	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A21R34	315-0180-00			RES.,FXD,CMPSN:18 OHM,5%,0.25W	01121	CB1805
A21R35	321-0068-00	B000100	B000119	RES.,FXD,FILM:49.9 OHM,1%,0.125W	91637	MFF1816G49R90F
A21R35	315-0181-00	B010120		RES.,FXD,CMPSN:180 OHM,5%,0.25W	01121	CB1815
A21R38	315-0181-00	B000100	B000119	RES.,FXD,CMPSN:180 OHM,5%,0.25W	01121	CB1815
A21R40	315-0101-00	B000100	B010361	RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A21R41	321-0047-00	B000100	B000119	RES.,FXD,FILM:30.1 OHM,1%,0.125W	91637	MFF1816G30R10F
A21R43	315-0101-00	B000100	B000119	RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A21R43	315-0101-00	B010362		RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A21R44	315-0622-00			RES.,FXD,CMPSN:6.2K OHM,5%,0.25W	01121	CB6225
A21R45	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A21R46	311-1501-00			RES.,VAR,NONWIR:20 OHM,10%,0.50W	73138	72-37-0
A21R51	311-1936-00	B010120		RES.,VAR,NONWIR:CKT BD,50 OHM,20%,0.5W	73138	72XR50-232A
A21R52	321-0134-00	B000100	B010684	RES.,FXD,FILM:243 OHM,1%,0.125W	91637	MFF1816G243R0F
A21R52	315-0201-00	B010685		RES.,FXD,CMPSN:200 OHM,5%,0.25W	01121	CB2015
A21R53	315-0201-00	B000100	B000119	RES.,FXD,CMPSN:200 OHM,5%,0.25W	01121	CB2015
A21R53	315-0200-00	B010120		RES.,FXD,CMPSN:20 OHM,5%,0.25W	01121	CB2005
A21R54	315-0200-00	B000100	B000119	RES.,FXD,CMPSN:20 OHM,5%,0.25W	01121	CB2005
A21R54	321-0047-00	B010120		RES.,FXD,FILM:30.1 OHM,1%,0.125W	91637	MFF1816G30R10F
A21R55	321-0097-00	B000100	B000119	RES.,FXD,FILM:100 OHM,1%,0.125W	91637	MFF1816G100R0F
A21R55	321-0051-00	B010120		RES.,FXD,FILM:33.2 OHM,1%,0.125W	91637	MFF1816G33R20F
A21R57	315-0430-00			RES.,FXD,CMPSN:43 OHM,5%,0.25W	01121	CB4305
A21R61	323-0134-00	B010685		RES.,FXD,FILM:243 OHM,1%,0.50W	91637	MFF1226G243R0F
A21R62	311-1936-00	B000100	B000119	RES.,VAR,NONWIR:CKT BD,50 OHM,20%,0.5W	73138	72XR50-232A
A21R63	321-0051-00	B000100	B000119	RES.,FXD,FILM:33.2 OHM,1%,0.125W	91637	MFF1816G33R20F
A21R63	321-0097-00	B010120		RES.,FXD,FILM:100 OHM,1%,0.125W	91637	MFF1816G100R0F
A21R64	315-0162-00	B000100	B000119	RES.,FXD,CMPSN:1.6K OHM,5%,0.25W	01121	CB1625
A21R65	315-0101-00	B000100	B000119	RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A21R65	315-0162-00	B010120		RES.,FXD,CMPSN:1.6K OHM,5%,0.25W	01121	CB1625
A21R72	315-0101-00	B010120		RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A21R73	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A21R74	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A21R84	321-0068-00			RES.,FXD,FILM:49.9 OHM,1%,0.125W	91637	MFF1816G49R90F
A21R86	321-0068-00	B000100	B000119	RES.,FXD,FILM:49.9 OHM,1%,0.125W	91637	MFF1816G49R90F
A21R87	321-0068-00			RES.,FXD,FILM:49.9 OHM,1%,0.125W	91637	MFF1816G49R90F
A21R97	321-0068-00	B010120		RES.,FXD,FILM:49.9 OHM,1%,0.125W	91637	MFF1816G49R90F

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A22	----- -----			CKT BOARD ASSY:IF MIXER		
A22	----- -----			(PART OF A82 1450,1450-01 OPT 03)		
A22	----- -----			(1450 & 1450-1 OPT. 3)		
A22	----- -----			CKT BOARD ASSY:IF MIXER(OPT 1 & 2)		
A22	----- -----			(PART OF A82 ONLY)		
A22C01	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A22C02	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A22C02	----- -----			(OPT 1 & 2 ONLY)		
A22C04	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A22C05	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A22C06	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A22C07	283-0637-00			CAP.,FXD,MICA D:20PF,2.5%,100V	00853	D151E200D0
A22C08	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A22C09	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A22C09	----- -----			(1450,1450-1 OPT. 3)		
A22C12	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A22C12	----- -----			(1450,1450-1 OPT. 3)		
A22C14	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A22C14	----- -----			(1450,1450-1 OPT. 3)		
A22C15	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A22C18	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A22C19	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A22C25	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A22C25	----- -----			(1450,1450-1 OPT.)		
A22C25	283-0649-00			CAP.,FXD,MICA D:105PF,1%,300V	00853	D155F1050F0
A22C25	----- -----			(OPTION 1 & 2)		
A22C26	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A22C27	281-0111-00			CAP.,VAR,AIR DI:2-27PF,650V	74970	193-8-5
A22C27	----- -----			(OPTION 1 & 2)		
A22C28	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A22C28	----- -----			(OPTION 1 & 2)		
A22C30	283-0781-00	B010120	B010307	CAP.,FXD,MICA D:27PF,5%,500V	09023	CD15ED270J03
A22C30	----- -----			(OPTION 1 & 2)		
A22C30	283-0643-00	B010308		CAP.,FXD,MICA D:22PF,+/-0.5PF,300V	00853	D105E220D0
A22C30	----- -----			(OPTION 1 & 2)		
A22C30	283-0781-00	B010267		CAP.,FXD,MICA D:27PF,5%,500V	09023	CD15ED270J03
A22C30	----- -----			(1450,1450-1 OPT. 3)		
A22C33	283-0649-00			CAP.,FXD,MICA D:105PF,1%,300V	00853	D155F1050F0
A32C33	----- -----			(OPTION 2 ONLY)		
A22C40	281-0512-00	B000100	B010121	CAP.,FXD,CER DI:27PF,+/-2.7PF,500V	59660	0301080C0G0270K
A22C40	----- -----			(OPTION 1 & 2)		
A22C40	281-0512-00	B000100	B010266	CAP.,FXD,CER DI:27PF,+/-2.7PF,500V	59660	0301080C0G0270K
A22C40	----- -----			(1450,1450-1 OPT. 3)		
A22C45	281-0093-00			CAP.,VAR,CER DI:5.5-18PF,350V	59660	538-011A5.5-18
A22C45	----- -----			(1450,1450-1 OPT. 3)		
A22C46	283-0635-00			CAP.,FXD,MICA D:51PF,1%,100V	00853	D151E510F0
A22C46	----- -----			(OPTION 1 & 2)		
A22C46	283-0639-00			CAP.,FXD,MICA D:56PF,1%,100V	00853	D151E560F0
A22C46	----- -----			(1450,1450-1 OPT. 3)		
A22C48	281-0093-00	B000100	B010134	CAP.,VAR,CER DI:5.5-18PF,350V	59660	538-011A5.5-18
A22C48	----- -----			(OPTION 1 & 2)		
A22C48	281-0167-00	B010135		CAP.,VAR,CER DI:9-45PF,200V	59660	538-011D9-45
A22C48	----- -----			(OPTION 1 & 2)		

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A22C53	283-0066-00	B010121		CAP.,FXD,CER DI:2.5PF,20%,200V	72982	8101-047C0J259D
A22C53	----- -----			(OPTION 1 & 2)		
A22C53	283-0111-00	B010266		CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A22C53	----- -----			(1450,1450-1 OPT. 3)		
A22C60	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A22C60	----- -----			(OPTION 1 & 2)		
A22C62	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A22C62	----- -----			(1450,1450-1 OPT. 3)		
A22C63	281-0170-00	B010121		CAP.,VAR,CER DI:1.25-3PF,100V	33095	53721003A125-3
A22C63	----- -----			(OPTION 1 & 2)		
A22C67	290-0782-00			CAP.,FXD,ELCTLT:4.7UF,+75-10%,35V	55680	ULA1V4R7TEA
A22C67	----- -----			(OPTION 1 & 2)		
A22C67	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A22C67	----- -----			(1450,1450-1 OPT. 3)		
A22C72	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A22C73	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A22C75	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A22C75	----- -----			(OPTION 1 & 2)		
A22C76	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A22C76	----- -----			(OPTION 1 & 2)		
A22C78	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A22C78	----- -----			(OPTION 1 & 2)		
A22C79	290-0782-00			CAP.,FXD,ELCTLT:4.7UF,+75-10%,35V	55680	ULA1V4R7TEA
A22C79	----- -----			(1450,1450-1 OPT. 3)		
A22C81	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A22C81	----- -----			(1450,1450-1 OPT. 3)		
A22C82	283-0111-00	B000100	B010121	CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A22C82	----- -----			(OPTION 1 ONLY)		
A22C82	283-0111-00	B000100	B010266	CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A22C82	----- -----			(1450 ONLY)		
A22C83	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A22C83	----- -----			(OPTION 1 & 2)		
A22C84	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A22C84	----- -----			(1450 ONLY)		
A22C91	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A22C91	----- -----			(OPTION 1 & 2)		
A22C94	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A22C94	----- -----			(1450,1450-1 OPT. 3)		
A22C95	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A22C95	----- -----			(OPTION 1 & 2)		
A22C96	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A22C96	----- -----			(OPTION 1 & 2)		
A22CR08	----- -----			(OPT 1 & 2 PART OF A82)		
A22CR08	----- -----			& 1450,1450-1 OPT. 3, PART OF A82)		
A22CR09	----- -----			(SEE FOOTNOTE ON A22CR08)		
A22CR17	----- -----			(SEE FOOTNOTE ON A22CR08)		
A22CR56	152-0715-00	B010120		SEMICOND DEVICE:SCHOTTKY,SI,RING QUAD	80009	152-0715-00
A22CR56	----- -----			(OPTION 1 & 2 TEMPORARY SUB		
A22CR56	----- -----			UNTIL ARRAY DIODE IS AVAILABLE)		
A22CR56	152-0715-00	B010267		SEMICOND DEVICE:SCHOTTKY,SI,RING QUAD	80009	152-0715-00
A22CR56	----- -----			(1450,1450-1 OPT. 3 TEMPORARY SUB		
A22CR56	----- -----			UNTIL ARRARY DIODE IS AVAILABLE)		
A22CR56	153-0044-00			SEMICOND DVC SE:SIGNAL,MATCHED	80009	153-0044-00

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A22CR58	153-0044-00	B000100	B000119	SEMICOND DVC SE:SIGNAL,MATCHED	80009	153-0044-00
A22CR58	----- -----			(1450 ONLY)		
A22CR58	153-0044-00	B000100	B010266	SEMICOND DVC SE:SIGNAL,MATCHED	80009	153-0044-00
A22CR58	----- -----			(1450 ONLY)		
A22L04	108-0733-00			COIL,RF:FIXED,113NH	80009	108-0733-00
A22L08	120-0382-00			XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
A22L15	120-0382-00			XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
A22L17	120-0382-00			XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
A22L31	120-0382-00			XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
A22L33	114-0266-00	B000100	B010134	COIL,RF:VARIABLE,400-800NH	80009	114-0266-00
A22L33	----- -----			(OPTION 1 & 2)		
A22L33	114-0246-00	B010135		COIL,RF:VARIABLE,700-1100NH	80009	114-0246-00
A22L33	----- -----			(OPTION 1 & 2)		
A22L36	114-0289-00			COIL,RF:	80009	114-0289-00
A22L36	----- -----			(1450,1450-1 OPT. 3)		
A22L36	114-0352-00			COIL,RF:VARIABLE,220 TO 400NH	80009	114-0352-00
A22L36	----- -----			(OPTION 1 & 2)		
A22L43	114-0333-00			COIL,RF:310-600NH,CORE 276-0506-00	80009	114-0333-00
A22L43	----- -----			(1450,1450-1 OPT. 3)		
A22L61	108-0311-00			COIL,RF:FIXED,153NH	80009	108-0311-00
A22L61	----- -----			(1450,1450-1 OPT. 3)		
A22L70	108-0311-00			COIL,RF:FIXED,153NH	80009	108-0311-00
A22L70	----- -----			(OPTION 1 & 2)		
A22L97	108-0054-00			COIL,RF:6.4UH	80009	108-0054-00
A22LR22	108-0212-00			COIL,RF:FIXED,495NH	80009	108-0212-00
A22LR86	108-0212-00			COIL,RF:FIXED,495NH	80009	108-0212-00
A22LR86	----- -----			(OPTION 1 & 2)		
A22LR87	108-0212-00			COIL,RF:FIXED,495NH	80009	108-0212-00
A22LR87	----- -----			(1450,1450-1 OPT. 3)		
A22Q02	151-0650-00			TRANSISTOR:SILICON,NPN	80009	151-0650-00
A22Q23	151-0472-00			TRANSISTOR:SILICON,NPN	51984	NE41632B
A22Q23	----- -----			(OPTION 1 & 2)		
A22Q23	151-0472-00	B000100	B010307	TRANSISTOR:SILICON,NPN	51984	NE41632B
A22Q23	----- -----			(1450 ONLY)		
A22Q23	151-0451-00	B010308		TRANSISTOR:SILICON,NPN	04713	SRF503
A22Q23	----- -----			(1450,1450-1 OPT. 3)		
A22Q71	151-0650-00			TRANSISTOR:SILICON,NPN	80009	151-0650-00
A22Q71	----- -----			(1450,1450-1 OPT. 3)		
A22Q74	151-0195-00	B000100	B010307	TRANSISTOR:SILICON,NPN	80009	151-0195-00
A22Q74	----- -----			(1450 ONLY)		
A22Q81	151-0650-00			TRANSISTOR:SILICON,NPN	80009	151-0650-00
A22Q81	----- -----			(OPTION 1 & 2)		
A22Q85	151-0472-00			TRANSISTOR:SILICON,NPN	51984	NE41632B
A22Q85	----- -----			(OPTION 1 & 2)		
A22Q85	151-0451-00	B010308		TRANSISTOR:SILICON,NPN	04713	SRF503
A22Q85	----- -----			(1450,1450-1 OPT. 3)		
A22Q93	151-0195-00			TRANSISTOR:SILICON,NPN	80009	151-0195-00
A22R00	321-0097-00			RES.,FXD,FILM:100 OHM,1%,0.125W	91637	MFF1816G100R0F
A22R07	321-0068-00			RES.,FXD,FILM:49.9 OHM,1%,0.125W	91637	MFF1816G49R90F
A22R07	----- -----			(OPTION 1 & 2)		
A22R11	321-0080-00			RES.,FXD,FILM:66.5 OHM,1%,0.125W	91637	MFF1816G66R50F
A22R11	----- -----			(OPTION 1 & 2)		
A22R11	315-0200-00			RES.,FXD,CMPSN:20 OHM,5%,0.25W	01121	CB2005
A22R11	----- -----			(1450,1450-1 OPT. 3)		

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A22R12	321-0068-00			RES.,FXD,FILM:49.9 OHM,1%,0.125W	91637	MFF1816G49R90F
A22R14	315-0200-00			RES.,FXD,CMPSN:20 OHM,5%,0.25W	01121	CB2005
A22R14	----- -----			(OPTION 1 & 2)		
A22R14	315-0241-00			RES.,FXD,CMPSN:240 OHM,5%,0.25W	01121	CB2415
A22R14	----- -----			(1450,1450-1 OPT. 3)		
A22R15	315-0241-00			RES.,FXD,CMPSN:240 OHM,5%,0.25W	01121	CB2415
A22R15	----- -----			(OPTION 1 & 2)		
A22R16	315-0200-00			RES.,FXD,CMPSN:20 OHM,5%,0.25W	01121	CB2005
A22R16	----- -----			(OPTION 1 & 2)		
A22R17	321-0068-00			RES.,FXD,FILM:49.9 OHM,1%,0.125W	91637	MFF1816G49R90F
A22R17	----- -----			(1450,1450-1 OPT. 3)		
A22R19	321-0068-00			RES.,FXD,FILM:49.9 OHM,1%,0.125W	91637	MFF1816G49R90F
A22R20	321-0122-00			RES.,FXD,FILM:182 OHM,1%,0.125W	91637	MFF1816G182R0F
A22R21	321-0210-00			RES.,FXD,FILM:1.5K OHM,1%,0.125W	91637	MFF1816G15000F
A22R24	321-0080-00			RES.,FXD,FILM:66.5 OHM,1%,0.125W	91637	MFF1816G66R50F
A22R24	----- -----			(1450,1450-1 OPT. 3)		
A22R25	315-0200-00			RES.,FXD,CMPSN:20 OHM,5%,0.25W	01121	CB2005
A22R25	----- -----			(1450,1450-1 OPT. 3 ONLY)		
A22R42	321-0001-00			RES.,FXD,FILM:10 OHM,1%,0.125W	75042	CEAT0-10R00F
A22R42	----- -----			(OPTION 1 & 2)		
A22R43	321-0105-00			RES.,FXD,FILM:121 OHM,1%,0.125W	01121	ORD BY DESCR
A22R46	321-0001-00			RES.,FXD,FILM:10 OHM,1%,0.125W	75042	CEAT0-10R00F
A22R46	----- -----			(OPTION 1 & 2)		
A22R51	311-1501-00	B010121		RES.,VAR,NONWIR:20 OHM,10%,0.50W	73138	72-37-0
A22R51	----- -----			(OPTION 1 & 2)		
A22R51	311-1501-00	B010267		RES.,VAR,NONWIR:20 OHM,10%,0.50W	73138	72-37-0
A22R51	----- -----			(1450,1450-1 OPT. 3)		
A22R52	317-0100-00	B010120		RES.,FXD,CMPSN:10 OHM,5%,0.125W	01121	BB1005
A22R52	----- -----			(OPTION 1 & 2)		
A22R52	317-0100-00	B010267		RES.,FXD,CMPSN:10 OHM,5%,0.125W	01121	BB1005
A22R52	----- -----			(1450,1450-1 OPT. 3)		
A22R53	317-0100-00	B010120		RES.,FXD,CMPSN:10 OHM,5%,0.125W	01121	BB1005
A22R53	----- -----			(OPTION 1 & 2)		
A22R53	317-0100-00	B010267		RES.,FXD,CMPSN:10 OHM,5%,0.125W	01121	BB1005
A22R53	----- -----			(1450,1450-1 OPT. 3)		
A22R54	321-0001-00			RES.,FXD,FILM:10 OHM,1%,0.125W	75042	CEAT0-10R00F
A22R54	----- -----			(1450,1450-1 OPT. 3)		
A22R55	321-0097-00			RES.,FXD,FILM:100 OHM,1%,0.125W	91637	MFF1816G100R0F
A22R55	----- -----			(1450,1450-1 OPT. 3)		
A22R62	321-0097-00	B000100	B010134	RES.,FXD,FILM:100 OHM,1%,0.125W	91637	MFF1816G100R0F
A22R62	----- -----			(OPTION 1 & 2)		
A22R62	321-0068-00	B010135	B011039	RES.,FXD,FILM:49.9 OHM,1%,0.125W	91637	MFF1816G49R90F
A22R62	----- -----			(OPTION 1 & 2)		
A22R62	321-0115-00	B011040		RES.,FXD,FILM:154 OHM,1%,0.125W	91637	CMF55116G154R0F
A22R64	321-0020-00	B000100	B010121	RES.,FXD,FILM:15.8 OHM,1%,0.125W	91637	MFF1816G15R80F
A22R64	----- -----			(1450 ONLY)		
A22R72	315-0200-00			RES.,FXD,CMPSN:20 OHM,5%,0.25W	01121	CB2005
A22R72	----- -----			(1450,1450-1 OPT. 3)		
A22R73	321-0080-00			RES.,FXD,FILM:66.5 OHM,1%,0.125W	91637	MFF1816G66R50F
A22R73	----- -----			(1450,1450-1 OPT. 3)		
A22R74	321-0068-00	B000100	B010120	RES.,FXD,FILM:49.9 OHM,1%,0.125W	91637	MFF1816G49R90F
A22R74	----- -----			(OPTION 1 & 2)		
A22R74	321-0049-00	B010121	B010134	RES.,FXD,FILM:31.6 OHM,1%,0.125W	91637	MFF1816G31R60F
A22R74	----- -----			(OPTION 1 & 2)		

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A22R74	321-0068-00	B010135	B011039	RES.,FXD,FILM:49.9 OHM,1%,0.125W	91637	MFF1816G49R90F
A22R74	----- -----			(OPTION 1 & 2)		
A22R74	321-0607-00	B011040		RES.,FXD,FILM:80 OHM,1%,0.125W	91637	MFF1816G80R00F
A22R75	315-0241-00			RES.,FXD,CMPSN:240 OHM,5%,0.25W	01121	CB2415
A22R75	----- -----			(OPTION 1 & 2)		
A22R76	321-0080-00			RES.,FXD,FILM:66.5 OHM,1%,0.125W	91637	MFF1816G66R50F
A22R76	----- -----			(OPTION 1 & 2)		
A22R81	321-0097-00			RES.,FXD,FILM:100 OHM,1%,0.125W	91637	MFF1816G100R0F
A22R82	321-0308-00			RES.,FXD,FILM:15.8K OHM,1%,0.125W	91637	MFF1816G15801F
A22R83	315-0200-00			RES.,FXD,CMPSN:20 OHM,5%,0.25W	01121	CB2005
A22R83	----- -----			(OPTION 1 & 2)		
A22R83	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
A22R83	----- -----			(1450,1450-1 OPT. 3)		
A22R84	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
A22R84	----- -----			(OPTION 1 & 2)		
A22R84	315-0200-00			RES.,FXD,CMPSN:20 OHM,5%,0.25W	01121	CB2005
A22R84	----- -----			(1450,1450-1 OPT. 3)		
A22R85	315-0200-00			RES.,FXD,CMPSN:20 OHM,5%,0.25W	01121	CB2005
A22R85	----- -----			(OPTION 1 & 2)		
A22R87	321-0184-00			RES.,FXD,FILM:806 OHM,1%,0.125W	91637	MFF1816G806R0F
A22R88	321-0124-00			RES.,FXD,FILM:191 OHM,1%,0.125W	91637	MFF1816G191R0F
A22R88	----- -----			(1450,1450-1 OPT. 3)		
A22R90	315-0472-00	B000100	B010134	RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A22R90	----- -----			(OPTION 1 & 2)		
A22R90	315-0102-00	B010135		RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A22R90	----- -----			(OPTION 1 & 2)		
A22R90	315-0472-00	B000100	B010208	RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A22R90	----- -----			(1450 ONLY)		
A22R90	315-0102-00	B010209		RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A22R90	----- -----			(1450,1450-1 OPT. 3)		
A22R92	321-0358-00			RES.,FXD,FILM:52.3K OHM,1%,0.125W	91637	MFF1816G52301F
A22R97	321-0124-00			RES.,FXD,FILM:191 OHM,1%,0.125W	91637	MFF1816G191R0F
A22R97	----- -----			(OPTION 1 & 2)		
A22RT22	307-0250-00			RES.,THERMAL:390 OHM,10%	15454	DG125390K
A22RT86	307-0250-00			RES.,THERMAL:390 OHM,10%	15454	DG125390K
A22T04	120-1158-00			XFMR,RF:BALUN ON 276-0712-00,TD-357	80009	120-1158-00
A22T48	120-1157-00			XFMR,RF:TOROID,4 T QUADFILAR	80009	120-1157-00
A22T48	----- -----			(1450,1450-1 OPT. 3)		
A22T54	120-1157-00			XFMR,RF:TOROID,4 T QUADFILAR	80009	120-1157-00
A22T58	120-1157-00			XFMR,RF:TOROID,4 T QUADFILAR	80009	120-1157-00
A22T58	----- -----			(OPTION 1 & 2)		
A22T61	120-1158-00			XFMR,RF:BALUN ON 276-0712-00,TD-357	80009	120-1158-00
A22T61	----- -----			(1450,1450-1 OPT. 3)		
A22T71	120-1158-00			XFMR,RF:BALUN ON 276-0712-00,TD-357	80009	120-1158-00
A22T71	----- -----			(OPTION 1 & 2)		
A22T71	120-1159-00			XFMR,RF:TOROID,7 T,TRIFILAR	80009	120-1159-00
A22T71	----- -----			(1450,1450-1 OPT. 3 ONLY)		
A22T76	120-1159-00			XFMR,RF:TOROID,7 T,TRIFILAR	80009	120-1159-00
A22T76	----- -----			(1450,1450-1 OPT. 3 ONLY)		
A22T78	120-1159-00			XFMR,RF:TOROID,7 T,TRIFILAR	80009	120-1159-00
A22T78	----- -----			(OPTION 1 & 2)		

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A23	670-5003-00	B000100	B010488	CKT BOARD ASSY:IF SWITCH AURAL DRIVE	80009	670-5003-00
A23	670-5003-01	B010489		CKT BOARD ASSY:IF SWITCH AURAL DRIVE	80009	670-5003-01
A23C11	283-0003-00	B010120		CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
A23C15	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
A23C20	283-0003-00	B000100	B000119	CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
A23C22	283-0203-00			CAP.,FXD,CER DI:0.47UF,20%,50V	04222	5R305SE474MAA
A23C27	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
A23C35	290-0782-00			CAP.,FXD,ELCTLT:4.7UF,+75-10%,35V	55680	ULA1V4R7TEA
A23C40	283-0640-00			CAP.,FXD,MICA D:160PF,1%,100V	00853	D155F161F0
A23C41	281-0167-00			CAP.,VAR,CER DI:9-45PF,200V	59660	538-011D9-45
A23C42	283-0625-00			CAP.,FXD,MICA D:220PF,1%,500V	00853	D105F221F0
A23C43	283-0625-00			CAP.,FXD,MICA D:220PF,1%,500V	00853	D105F221F0
A23C44	281-0167-00			CAP.,VAR,CER DI:9-45PF,200V	59660	538-011D9-45
A23C46	283-0625-00			CAP.,FXD,MICA D:220PF,1%,500V	00853	D105F221F0
A23C47	283-0728-00			CAP.,FXD,MICA D:120PF,1%,500V	00853	D155F121F0
A23C48	281-0167-00			CAP.,VAR,CER DI:9-45PF,200V	59660	538-011D9-45
A23C64	283-0638-00			CAP.,FXD,MICA D:130PF,1%,100V	00853	D151F131F0
A23C65	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A23C66	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A23C71	283-0638-00	B000100	B000119	CAP.,FXD,MICA D:130PF,1%,100V	00853	D151F131F0
A23C71	283-0638-00	B010335		CAP.,FXD,MICA D:130PF,1%,100V	00853	D151F131F0
A23C73	283-0638-00	B010120	B010334	CAP.,FXD,MICA D:130PF,1%,100V	00853	D151F131F0
A23C75	283-0177-00			CAP.,FXD,CER DI:1UF,+80-20%,25V	04222	SR302E105ZAA
A23C84	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
A23C89	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
A23C93	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
A23C99	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
A23CR83	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A23CR84	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A23CR88	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A23CR94	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A23CR95	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A23CR97	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A23L26	108-0215-00	B000100	B000119	COIL,RF:1.1UH	80009	108-0215-00
A23L36	120-0382-00	B010120		XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
A23L51	114-0266-00			COIL,RF:VARIABLE,400-800NH	80009	114-0266-00
A23L54	114-0266-00			COIL,RF:VARIABLE,400-800NH	80009	114-0266-00
A23L58	114-0266-00			COIL,RF:VARIABLE,400-800NH	80009	114-0266-00
A23L61	114-0333-00			COIL,RF:310-600NH,CORE 276-0506-00	80009	114-0333-00
A23L82	120-0382-00			XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
A23Q13	151-0472-00			TRANSISTOR:SILICON,NPN	51984	NE41632B
A23Q17	151-0333-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS918	04713	SPS1752
A23R11	315-0102-00	B000100	B000119	RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A23R13	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
A23R15	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A23R23	315-0622-00			RES.,FXD,CMPSN:6.2K OHM,5%,0.25W	01121	CB6225
A23R24	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A23R25	315-0430-00			RES.,FXD,CMPSN:43 OHM,5%,0.25W	01121	CB4305
A23R27	315-0121-00			RES.,FXD,CMPSN:120 OHM,5%,0.25W	01121	CB1215
A23R33	315-0430-00	B010120		RES.,FXD,CMPSN:43 OHM,5%,0.25W	01121	CB4305
A23R36	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
A23R39	315-0430-00	B000100	B000119	RES.,FXD,CMPSN:43 OHM,5%,0.25W	01121	CB4305
A23R64	321-0130-00			RES.,FXD,FILM:221 OHM,1%,0.125W	91637	MFF1816G221R0F
A23R65	321-0037-00			RES.,FXD,FILM:23.7 OHM,1%,0.125W	91637	MFF1816G23R70F

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A23R66	321-0130-00			RES.,FXD,FILM:221 OHM,1%,0.125W	91637	MFF1816G221R0F
A23R71	315-0102-00	B010120		RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A23R78	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A23R81	321-0099-00			RES.,FXD,FILM:105 OHM,1%,0.125W	91637	MFF1816G105R0F
A23R82	321-0006-00			RES.,FXD,FILM:11.3 OHM,1%,0.125W	24546	NA55D11R3F
A23R83	321-0006-00			RES.,FXD,FILM:11.3 OHM,1%,0.125W	24546	NA55D11R3F
A23R86	301-0511-00			RES.,FXD,CMPSN:510 OHM,5%,0.50W	01121	EB5115
A23R87	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
A23R96	301-0511-00			RES.,FXD,CMPSN:510 OHM,5%,0.50W	01121	EB5115
A23R97	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
A23T29	120-1155-00			XFMR,RF:TOROID,4 T TRIFILAR	80009	120-1155-00

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A24	670-5004-01	B010100	B010774	CKT BOARD ASSY:IF SAW AMP	80009	670-5004-01
A24	670-5004-07	B010775		CKT BOARD ASSY:IF SAW AMP	80009	670-5004-07
A24C54	283-0672-00	B000100	B000119	CAP.,FXD,MICA D:200PF,1%,500V	00853	D155F2010F0
A24C54	283-0598-00	B010120		CAP.,FXD,MICA D:253PF,5%,300V	09023	CD15FD(253)J03
A24C57	290-0804-00			CAP.,FXD,ELCTLT:10UF,+50-10%,25V	55680	ULA1E100TEA
A24C65	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A24C66	290-0804-00			CAP.,FXD,ELCTLT:10UF,+50-10%,25V	55680	ULA1E100TEA
A24C73	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A24C74	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A24C76	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A24C78	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A24C83	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A24C85	283-0203-00			CAP.,FXD,CER DI:0.47UF,20%,50V	04222	5R305SE474MAA
A24C90	----- -----			TEST SELECTED		
A24C95	283-0203-00			CAP.,FXD,CER DI:0.47UF,20%,50V	04222	5R305SE474MAA
A24C96	283-0111-00	B000100	B000119	CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A24C96	283-0636-00	B010120		CAP.,FXD,MICA D:36PF,1.4%,100V	00853	D155E360G0
A24C98	283-0635-00			CAP.,FXD,MICA D:51PF,1%,100V	00853	D151E510F0
A24C99	283-0111-00	B010120		CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A24CR18	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A24CR78	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A24FL23	155-0162-00			MICROCIRCUIT,LI:SURFACE ACOUSTIC WAVE FLTR	80009	155-0162-00
A24L52	114-0288-00			COIL,RF:VARIABLE,450-850NH	80009	114-0288-00
A24L58	120-0382-00			XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
A24L66	120-0382-00			XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
A24L83	120-0382-00			XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
A24Q71	151-0451-00			TRANSISTOR:SILICON,NPN	04713	SRF503
A24Q82	151-0438-00			TRANSISTOR:SILICON,PNP,SEL FROM SPS692	80009	151-0438-00
A24Q85	151-0223-00			TRANSISTOR:SILICON,NPN	04713	SPS8026
A24Q97	151-0472-00	B000100	B010500	TRANSISTOR:SILICON,NPN	51984	NE41632B
A24Q97	151-0472-02	B010501		TRANSISTOR:SILICON,NPN	80009	151-0472-02
A24R63	305-0271-00			RES.,FXD,CMPSN:270 OHM,5%,2W	01121	HB2715
A24R65	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
A24R70	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
A24R71	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A24R72	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A24R73	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
A24R75	315-0622-00			RES.,FXD,CMPSN:6.2K OHM,5%,0.25W	01121	CB6225
A24R76	311-1501-00	B000100	B010774	RES.,VAR,NONWIR:20 OHM,10%,0.50W	73138	72-37-0
A24R76	315-0200-00	B010775		RES.,FXD,CMPSN:20 OHM,5%,0.25W	01121	CB2005
A24R77	315-0200-00			RES.,FXD,CMPSN:20 OHM,5%,0.25W	01121	CB2005
A24R79	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A24R81	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A24R83	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A24R85	321-0030-00			RES.,FXD,FILM:20 OHM,1%,0.125W	91637	MFF1816G20R00F
A24R87	321-0068-00			RES.,FXD,FILM:49.9 OHM,1%,0.125W	91637	MFF1816G49R90F
A24R88	315-0162-00			RES.,FXD,CMPSN:1.6K OHM,5%,0.25W	01121	CB1625
A24R90	----- -----			TEST SELECTED		
A24R93	311-1936-00			RES.,VAR,NONWIR:CKT BD,50 OHM,20%,0.5W	73138	72XR50-232A
A24R96	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A24R97	321-0092-00			RES.,FXD,FILM:88.7 OHM,1%,0.125W	91637	MFF1816G88R70F
A24R98	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A24T55	120-0487-00			XFMR,TOROID:5 TURNS BIFILAR	80009	120-0487-00

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A25	670-5004-00	B000100	B010774	CKT BOARD ASSY:IF SAW AMP	80009	670-5004-00
A25	670-5004-06	B010775		CKT BOARD ASSY:IF SAW AMP	80009	670-5004-06
A25C54	283-0672-00	B000100	B000119	CAP.,FXD,MICA D:200PF,1%,500V	00853	D155F2010F0
A25C54	283-0598-00	B010120		CAP.,FXD,MICA D:253PF,5%,300V	09023	CD15FD(253)J03
A25C57	290-0804-00			CAP.,FXD,ELCTLT:10UF,+50-10%,25V	55680	ULA1E100TEA
A25C65	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A25C66	290-0804-00			CAP.,FXD,ELCTLT:10UF,+50-10%,25V	55680	ULA1E100TEA
A25C73	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A25C74	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A25C76	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A25C78	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A25C83	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A25C85	283-0203-00			CAP.,FXD,CER DI:0.47UF,20%,50V	04222	5R305SE474MAA
A25C90	----- -----			TEST SELECTED		
A25C95	283-0203-00			CAP.,FXD,CER DI:0.47UF,20%,50V	04222	5R305SE474MAA
A25C96	283-0111-00	B000100	B000119	CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A25C96	283-0636-00	B010120		CAP.,FXD,MICA D:36PF,1.4%,100V	00853	D155E360G0
A25C98	283-0635-00			CAP.,FXD,MICA D:51PF,1%,100V	00853	D151E510F0
A25C99	283-0111-00	B010120		CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A25CR18	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A25CR78	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A25FL23	155-0163-00			MICROCIRCUIT,LI:SURFACE ACOUSTIC WAVE FLTR	80009	155-0163-00
A25L52	114-0228-00			COIL,RF:	80009	114-0228-00
A25L58	120-0382-00			XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
A25L66	120-0382-00			XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
A25L83	120-0382-00			XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
A25Q71	151-0451-00			TRANSISTOR:SILICON,NPN	04713	SRF503
A25Q82	151-0438-00			TRANSISTOR:SILICON,PNP,SEL FROM SPS692	80009	151-0438-00
A25Q85	151-0223-00			TRANSISTOR:SILICON,NPN	04713	SPS8026
A25Q97	151-0472-00	B000100	B010500	TRANSISTOR:SILICON,NPN	51984	NE41632B
A25Q97	151-0472-02	B010501		TRANSISTOR:SILICON,NPN	80009	151-0472-02
A25R63	305-0271-00			RES.,FXD,CMPSN:270 OHM,5%,2W	01121	HB2715
A25R65	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
A25R70	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
A25R71	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A25R72	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A25R73	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
A25R75	315-0622-00			RES.,FXD,CMPSN:6.2K OHM,5%,0.25W	01121	CB6225
A25R76	311-1501-00	B000100	B010774	RES.,VAR,NONWIR:20 OHM,10%,0.50W	73138	72-37-0
A25R76	315-0200-00	B010775		RES.,FXD,CMPSN:20 OHM,5%,0.25W	01121	CB2005
A25R77	315-0200-00			RES.,FXD,CMPSN:20 OHM,5%,0.25W	01121	CB2005
A25R79	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A25R81	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A25R83	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A25R85	321-0030-00			RES.,FXD,FILM:20 OHM,1%,0.125W	91637	MFF1816G20R00F
A25R87	321-0068-00			RES.,FXD,FILM:49.9 OHM,1%,0.125W	91637	MFF1816G49R90F
A25R88	315-0162-00			RES.,FXD,CMPSN:1.6K OHM,5%,0.25W	01121	CB1625
A25R90	----- -----			TEST SELECTED		
A25R93	311-1936-00			RES.,VAR,NONWIR:CKT BD,50 OHM,20%,0.5W	73138	72XR50-232A
A25R96	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A25R97	321-0101-00			RES.,FXD,FILM:110 OHM,1%,0.125W	91637	MFF1816G110R0F
A25R98	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A25T55	120-0487-00			XFMR,TOROID:5 TURNS BIFILAR	80009	120-0487-00

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A26	670-5005-00	B010100	B011036	CKT BOARD ASSY:IF POST AMP	80009	670-5005-00
A26	----- -----			(1450 ONLY)		
A26	670-6667-01	B011037	B011202	CKT BOARD ASSY:IF POST AMP	80009	670-6667-01
A26	----- -----			(1450 ONLY)		
A26	670-6667-02	B011203		CKT BOARD ASSY:IF POST AMP	80009	670-6667-02
A26	----- -----			(1450 ONLY)		
A26C22	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A26C24	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A26C25	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A26C26	283-0635-00			CAP.,FXD,MICA D:51PF,1%,100V	00853	D151E510F0
A26C27	283-0648-00			CAP.,FXD,MICA D:10PF,5%,100V	00853	D151C100D0
A26C28	283-0692-00			CAP.,FXD,MICA D:670PF,1%,300V	00853	D15-3F671F0
A26C31	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A26C35	283-0203-00			CAP.,FXD,CER DI:0.47UF,20%,50V	04222	5R305SE474MAA
A26C37	283-0648-00			CAP.,FXD,MICA D:10PF,5%,100V	00853	D151C100D0
A26C43	283-0203-00			CAP.,FXD,CER DI:0.47UF,20%,50V	04222	5R305SE474MAA
A26C45	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A26C46	283-0635-00			CAP.,FXD,MICA D:51PF,1%,100V	00853	D151E510F0
A26C52	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A26C55	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A26C56	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A26C57	290-0782-00			CAP.,FXD,ELCTLT:4.7UF,+75-10%,35V	55680	ULA1V4R7TEA
A26C58	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A26C62	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A26C64	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A26C67	283-0600-00			CAP.,FXD,MICA D:43PF,5%,500V	00853	D105E430J0
A26C76	290-0782-00			CAP.,FXD,ELCTLT:4.7UF,+75-10%,35V	55680	ULA1V4R7TEA
A26C84	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A26C85	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A26C94	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A26CR56	152-0579-00			SEMICOND DEVICE:SILICON,100V,2.5A	12969	UM6601B
A26E13	276-0543-00			SHLD BEAD,ELEK:FERRITE	80009	276-0543-00
A26E23	276-0543-00			SHLD BEAD,ELEK:FERRITE	80009	276-0543-00
A26E33	276-0543-00			SHLD BEAD,ELEK:FERRITE	80009	276-0543-00
A26E71	276-0543-00	B000102		SHLD BEAD,ELEK:FERRITE	80009	276-0543-00
A26LR81	108-0212-00	B000102		COIL,RF:FIXED,495NH	80009	108-0212-00
A26L56	120-0382-00			XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
A26L58	120-0382-00			XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
A26L77	108-0250-00			COIL,RF:	80009	108-0250-00
A26L78	120-0382-00			XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
A26Q13	151-0333-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS918	04713	SPS1752
A26Q23	151-0333-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS918	04713	SPS1752
A26Q33	151-0472-00	B000100	B010500	TRANSISTOR:SILICON,NPN	51984	NE41632B
A26Q33	151-0472-02	B010501		TRANSISTOR:SILICON,NPN	80009	151-0472-02
A26Q53	151-0223-00	B000100	B011036	TRANSISTOR:SILICON,NPN	04713	SPS8026
A26Q53	----- -----			(1450 ONLY)		
A26Q53	151-0333-00	B011037		TRANSISTOR:SILICON,NPN,SEL FROM MPS918	04713	SPS1752
A26Q53	----- -----			(1450 ONLY)		
A26Q53	151-0223-00	B010380	B011036	TRANSISTOR:SILICON,NPN	04713	SPS8026
A26Q53	----- -----			(1450-1 ONLY)		
A26Q53	151-0333-00	B011037		TRANSISTOR:SILICON,NPN,SEL FROM MPS918	04713	SPS1752
A26Q53	----- -----			(1450-1 ONLY)		
A26Q71	151-0438-00			TRANSISTOR:SILICON,PNP,SEL FROM SPS692	80009	151-0438-00
A26Q81	151-0451-00			TRANSISTOR:SILICON,NPN	04713	SRF503

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A26R10	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
A26R11	315-0201-00			RES.,FXD,CMPSN:200 OHM,5%,0.25W	01121	CB2015
A26R12	315-0132-00			RES.,FXD,CMPSN:1.3K OHM,5%,0.25W	01121	CB1325
A26R15	307-0103-00			RES.,FXD,CMPSN:2.7 OHM,5%,0.25W	01121	CB27G5
A26R21	315-0181-00			RES.,FXD,CMPSN:180 OHM,5%,0.25W	01121	CB1815
A26R22	315-0201-00			RES.,FXD,CMPSN:200 OHM,5%,0.25W	01121	CB2015
A26R30	315-0822-00			RES.,FXD,CMPSN:8.2K OHM,5%,0.25W	01121	CB8225
A26R31	315-0132-00			RES.,FXD,CMPSN:1.3K OHM,5%,0.25W	01121	CB1325
A26R32	321-0089-00			RES.,FXD,FILM:82.5 OHM,1%,0.125W	91637	MFF1816G82R50F
A26R34	307-0103-00			RES.,FXD,CMPSN:2.7 OHM,5%,0.25W	01121	CB27G5
A26R41	311-1936-00			RES.,VAR,NONWIR:CKT BD,50 OHM,20%,0.5W	73138	72XR50-232A
A26R42	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A26R44	315-0162-00			RES.,FXD,CMPSN:1.6K OHM,5%,0.25W	01121	CB1625
A26R45	315-0201-00			RES.,FXD,CMPSN:200 OHM,5%,0.25W	01121	CB2015
A26R46	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A26R48	315-0301-00			RES.,FXD,CMPSN:300 OHM,5%,0.25W	01121	CB3015
A26R53	321-0030-00			RES.,FXD,FILM:20 OHM,1%,0.125W	91637	MFF1816G20R00F
A26R54	315-0200-00	B000100	B000102	RES.,FXD,CMPSN:20 OHM,5%,0.25W	01121	CB2005
A26R54	315-0330-00	B000103	B011202	RES.,FXD,CMPSN:33 OHM,5%,0.25W	01121	CB3305
A26R54	315-0510-00	B011203		RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB5105
A26R58	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
A26R63	321-0134-00	B000100	B000101	RES.,FXD,FILM:243 OHM,1%,0.125W	91637	MFF1816G243R0F
A26R63	321-0147-00	B000102		RES.,FXD,FILM:332 OHM,1%,0.125W	91637	MFF1816G332R0F
A26R64	311-1501-00	B000100	B011202	RES.,VAR,NONWIR:20 OHM,10%,0.50W	73138	72-37-0
A26R64	131-0566-00	B011203		BUS CONDUCTOR:DUMMY RES,2.375,22 AWG	57668	JWW-0200E0
A26R65	315-0301-00			RES.,FXD,CMPSN:300 OHM,5%,0.25W	01121	CB3015
A26R66	315-0430-00			RES.,FXD,CMPSN:43 OHM,5%,0.25W	01121	CB4305
A26R70	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
A26R71	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A26R72	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A26R73	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A26R74	315-0622-00			RES.,FXD,CMPSN:6.2K OHM,5%,0.25W	01121	CB6225
A26R75	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
A26R81	315-0101-00	B000100	B000101	RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A26R85	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
A26R87	321-0068-00			RES.,FXD,FILM:49.9 OHM,1%,0.125W	91637	MFF1816G49R90F
A26R96	321-0068-00			RES.,FXD,FILM:49.9 OHM,1%,0.125W	91637	MFF1816G49R90F
A26R97	305-0271-00			RES.,FXD,CMPSN:270 OHM,5%,2W	01121	HB2715

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A27	670-5008-00			CKT BOARD ASSY:IF ZERO CARRIER/PH SHIFTER	80009	670-5008-00
A27C03	283-0633-00			CAP.,FXD,MICA D:77PF,1%,100V	00853	D155E770F0
A27C10	281-0096-00			CAP.,VAR,AIR DI:5.5-18PF,350V	59660	538-006-A5.5-18
A27C27	283-0668-00	B000100	B000119	CAP.,FXD,MICA D:184PF,1%,500V	00853	D155F1840F0
A27C27	283-0598-00	B010120		CAP.,FXD,MICA D:253PF,5%,300V	09023	CD15FD(253)J03
A27C31	283-0598-00			CAP.,FXD,MICA D:253PF,5%,300V	09023	CD15FD(253)J03
A27C56	283-0644-00			CAP.,FXD,MICA D:150PF,1%,500V	00853	D155F151F0
A27C57	283-0177-00			CAP.,FXD,CER DI:1UF,+80-20%,25V	04222	SR302E105ZAA
A27C88	283-0598-00	B000100	B000119	CAP.,FXD,MICA D:253PF,5%,300V	09023	CD15FD(253)J03
A27C88	283-0668-00	B010120		CAP.,FXD,MICA D:184PF,1%,500V	00853	D155F1840F0
A27C95	283-0706-00			CAP.,FXD,MICA D:91PF,+/-1PF,500V	00853	D155F910F0
A27CR53	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A27CR66	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A27CR74	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A27CR75	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A27CR84	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A27CR85	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A27L13	114-0220-00			COIL,RF:1-3UH,CORE 276-0568-00	80009	114-0220-00
A27L21	114-0333-00			COIL,RF:310-600NH,CORE 276-0506-00	80009	114-0333-00
A27L25	114-0333-00			COIL,RF:310-600NH,CORE 276-0506-00	80009	114-0333-00
A27L48	120-1143-00			XFMR,RF:VARIABLE	80009	120-1143-00
A27L89	108-0733-00			COIL,RF:FIXED,113NH	80009	108-0733-00
A27L98	120-1146-00			XFMR,RF:VARIABLE	80009	120-1146-00
A27Q58	151-0325-00	B000100	B010647	TRANSISTOR:SILICON,PNP,SEL FROM 2N4258	80009	151-0325-00
A27Q58	151-0325-01	B010648		TRANSISTOR:SILICON,PNP,SEL	80009	151-0325-01
A27R33	321-0085-00			RES.,FXD,FILM:75 OHM,1%,0.125W	91637	MFF1816G75R00F
A27R43	321-0071-00			RES.,FXD,FILM:53.6 OHM,1%,0.125W	91637	MFF1816G53R60F
A27R44	321-0085-00			RES.,FXD,FILM:75 OHM,1%,0.125W	91637	MFF1816G75R00F
A27R45	321-0022-00			RES.,FXD,FILM:16.5 OHM,1%,0.125W	91637	CMF55-116D16R50F
A27R55	315-0510-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB5105
A27R58	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A27R62	315-0330-00			RES.,FXD,CMPSN:33 OHM,5%,0.25W	01121	CB3305
A27R66	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
A27R68	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A27R72	311-1501-00	B000100	B000119	RES.,VAR,NONWIR:20 OHM,10%,0.50W	73138	72-37-0
A27R72	311-1423-00	B010120		RES.,VAR,NONWIR:20 OHM,20%,0.50W	73138	72PM R20-1A
A27R73	315-0220-00			RES.,FXD,CMPSN:22 OHM,5%,0.25W	01121	CB2205
A27R75	315-0330-00			RES.,FXD,CMPSN:33 OHM,5%,0.25W	01121	CB3305
A27R82	321-0007-00			RES.,FXD,FILM:11.5 OHM,1%,0.125W	91637	CMF55116G11R50F
A27R83	321-0158-00			RES.,FXD,FILM:432 OHM,1%,0.125W	91637	MFF1816G432R0F
A27R84	315-0330-00			RES.,FXD,CMPSN:33 OHM,5%,0.25W	01121	CB3305
A27R94	321-0158-00			RES.,FXD,FILM:432 OHM,1%,0.125W	91637	MFF1816G432R0F
A27T55	120-1156-00			XFMR,RF:TOROID,11 T,TRIFILAR	80009	120-1156-00
A27T65	120-1428-00			XFMR,RF:TOROID	80009	120-1428-00
A27T94	120-1156-00			XFMR,RF:TOROID,11 T,TRIFILAR	80009	120-1156-00

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A28	670-5009-00	B010120	B010949	CKT BOARD ASSY:IF DET/VIDEO AMP	80009	670-5009-00
A28	670-5009-02	B010950		CKT BOARD ASSY:IF DET/VIDEO AMP	80009	670-5009-02
A28C05	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A28C07	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
A28C17	283-0635-00			CAP.,FXD,MICA D:51PF,1%,100V	00853	D151E510F0
A28C34	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
A28C41	283-0630-00			CAP.,FXD,MICA D:110PF,1%,100V	00853	D155F111F0
A28C47	283-0599-00			CAP.,FXD,MICA D:98PF,5%,500V	00853	D105F980J0
A28C51	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A28C57	283-0663-00			CAP.,FXD,MICA D:16.8PF,+/-0.5PF,500V	00853	D155C16R8D0
A28C58	290-0804-00			CAP.,FXD,ELCTLT:10UF,+50-10%,25V	55680	ULA1E100TEA
A28C59	290-0804-00			CAP.,FXD,ELCTLT:10UF,+50-10%,25V	55680	ULA1E100TEA
A28C66	283-0620-00			CAP.,FXD,MICA D:470PF,1%,300V	00853	D155F4771FO
A28C76	283-0177-00			CAP.,FXD,CER DI:1UF,+80-20%,25V	04222	SR302E105ZAA
A28C78	283-0177-00			CAP.,FXD,CER DI:1UF,+80-20%,25V	04222	SR302E105ZAA
A28C86	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020FL
A28C98	283-0084-00			CAP.,FXD,CER DI:270PF,5%,1000V	59660	838 533X5F0 2715
A28E83	276-0543-00			SHLD BEAD,ELEK:FERRITE	80009	276-0543-00
A28L38	108-0262-00			COIL,RF:FIXED,510NH	80009	108-0262-00
A28L44	114-0325-00			COIL,RF:VARIABLE,2.4-6.7UH	80009	114-0325-00
A28L54	114-0222-00			COIL,RF:2-6UH,CORE 276-0568-00	80009	114-0222-00
A28L64	120-1144-00			XFMR,RF:VARIABLE	80009	120-1144-00
A28L88	108-0733-00	B010278		COIL,RF:FIXED,113NH	80009	108-0733-00
A28L89	108-0733-00	B010278		COIL,RF:FIXED,113NH	80009	108-0733-00
A28LR14	108-0212-00			COIL,RF:FIXED,495NH	80009	108-0212-00
A28LR24	108-0212-00			COIL,RF:FIXED,495NH	80009	108-0212-00
A28Q11	151-0195-00			TRANSISTOR:SILICON,NPN	80009	151-0195-00
A28Q20	151-0195-00			TRANSISTOR:SILICON,NPN	80009	151-0195-00
A28Q21	151-0220-00			TRANSISTOR:SILICON,PNP	07263	S036228
A28Q31	151-0220-00			TRANSISTOR:SILICON,PNP	07263	S036228
A28Q71	151-0195-00			TRANSISTOR:SILICON,NPN	80009	151-0195-00
A28Q81	151-0195-00			TRANSISTOR:SILICON,NPN	80009	151-0195-00
A28Q83	151-0438-00			TRANSISTOR:SILICON,PNP,SEL FROM SPS692	80009	151-0438-00
A28Q86	151-0103-00			TRANSISTOR:SILICON,NPN	80009	151-0103-00
A28R01	321-0085-00			RES.,FXD,FILM:75 OHM,1%,0.125W	91637	MFF1816G75R00F
A28R02	321-0085-00			RES.,FXD,FILM:75 OHM,1%,0.125W	91637	MFF1816G75R00F
A28R11	311-1239-00			RES.,VAR,NONWIR:2.5K OHM,10%,0.50W	73138	72-26-0
A28R12	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
A28R14	321-0142-00			RES.,FXD,FILM:294 OHM,1%,0.125W	91637	MFF1816G294R0F
A28R16	321-0091-00			RES.,FXD,FILM:86.6 OHM,1%,0.125W	91637	MFF1816G86R60F
A28R19	321-0088-00			RES.,FXD,FILM:80.6 OHM,1%,0.125W	91637	MFF1816G80R60F
A28R23	321-0211-00			RES.,FXD,FILM:1.54K OHM,1%,0.125W	91637	MFF1816G15400F
A28R24	321-0195-00			RES.,FXD,FILM:1.05K OHM,1%,0.125W	91637	MFF1816G10500F
A28R25	321-0195-00			RES.,FXD,FILM:1.05K OHM,1%,0.125W	91637	MFF1816G10500F
A28R31	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
A28R37	315-0560-00			RES.,FXD,CMPSN:56 OHM,5%,0.25W	01121	CB5605
A28R40	----- -----			(TEST SELECTED, EITHER A28R40 OR A28R43		
A28R40	----- -----			MAY BE USED, NOT BOTH AT THE SAME TIME)		
A28R41	321-0193-07			RES.,FXD,FILM:1K OHM,0.1%,0.125W	91637	MFF1816C10000B
A28R42	321-0193-07			RES.,FXD,FILM:1K OHM,0.1%,0.125W	91637	MFF1816C10000B
A28R43	----- -----			(TEST SELECTED, SEE FOOTNOTE ON A28R40)		
A28R60	311-1241-00			RES.,VAR,NONWIR:100K OHM,10%,0.5W	32997	3386X-T07-104
A28R61	321-0306-00			RES.,FXD,FILM:15K OHM,1%,0.125W	91637	MFF1816G15001F
A28R62	321-0312-00			RES.,FXD,FILM:17.4K OHM,1%,0.125W	91637	MFF1816G17401F

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A28R64	321-0097-00			RES.,FXD,FILM:100 OHM,1%,0.125W	91637	MFF1816G100R0F
A28R72	321-0093-00			RES.,FXD,FILM:90.9 OHM,1%,0.125W	91637	MFF1816G90R90F
A28R77	301-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.50W	01121	EB1015
A28R83	321-0222-00			RES.,FXD,FILM:2K OHM,1%,0.125W	91637	MFF1816G20000F
A28R85	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
A28R86	315-0220-00			RES.,FXD,CMPSN:22 OHM,5%,0.25W	01121	CB2205
A28R87	321-0066-00			RES.,FXD,FILM:47.5 OHM,1%,0.125W	91637	MFF1816G47R50F
A28R88	321-0085-00			RES.,FXD,FILM:75 OHM,1%,0.125W	91637	MFF1816G75R00F
A28R89	321-0085-00			RES.,FXD,FILM:75 OHM,1%,0.125W	91637	MFF1816G75R00F
A28R90	321-0302-00			RES.,FXD,FILM:13.7K OHM,1%,0.125W	91637	MFF1816G13701F
A28R91	321-0273-00			RES.,FXD,FILM:6.81K OHM,1%,0.125W	91637	MFF1816G68100F
A28R92	315-0513-00			RES.,FXD,CMPSN:51K OHM,5%,0.25W	01121	CB5135
A28R93	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A28R95	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
A28R97	308-0299-00			RES.,FXD,WW:300 OHM,1%,3W	01686	T2A-300R-F-10
A28T09	120-1149-00			XFMR,RF:TOROID,5 T QUADFILAR	80009	120-1149-00
A28T27	120-1148-00			XFMR,RF:TOROID,5 T,TRIFILAR	80009	120-1148-00
A28U14	156-0130-01			MICROCIRCUIT,LI:MODULATOR/DEMODULATOR	04713	MC1596G
A28VR94	152-0166-00			SEMICOND DEVICE:ZENER,0.4W,6.2V,5%	04713	SZ11738RL

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A29	670-5009-00	B010120	B010949	CKT BOARD ASSY:IF DET/VIDEO AMP	80009	670-5009-00
A29	670-5009-02	B010950		CKT BOARD ASSY:IF DET/VIDEO AMP	80009	670-5009-02
A29C05	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A29C07	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
A29C17	283-0635-00			CAP.,FXD,MICA D:51PF,1%,100V	00853	D151E510F0
A29C34	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
A29C41	283-0630-00			CAP.,FXD,MICA D:110PF,1%,100V	00853	D155F111F0
A29C47	283-0599-00			CAP.,FXD,MICA D:98PF,5%,500V	00853	D105F980J0
A29C51	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A29C57	283-0663-00			CAP.,FXD,MICA D:16.8PF,+/-0.5PF,500V	00853	D155C16R8D0
A29C58	290-0804-00			CAP.,FXD,ELCTLT:10UF,+50-10%,25V	55680	ULA1E100TEA
A29C59	290-0804-00			CAP.,FXD,ELCTLT:10UF,+50-10%,25V	55680	ULA1E100TEA
A29C66	283-0620-00			CAP.,FXD,MICA D:470PF,1%,300V	00853	D155F4771FO
A29C76	283-0177-00			CAP.,FXD,CER DI:1UF,+80-20%,25V	04222	SR302E105ZAA
A29C78	283-0177-00			CAP.,FXD,CER DI:1UF,+80-20%,25V	04222	SR302E105ZAA
A29C86	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020FL
A29C98	283-0084-00			CAP.,FXD,CER DI:270PF,5%,1000V	59660	838 533X5F0 2715
A29E83	276-0543-00			SHLD BEAD,ELEK:FERRITE	80009	276-0543-00
A29L38	108-0262-00			COIL,RF:FIXED,510NH	80009	108-0262-00
A29L44	114-0325-00			COIL,RF:VARIABLE,2.4-6.7UH	80009	114-0325-00
A29L54	114-0222-00			COIL,RF:2-6UH,CORE 276-0568-00	80009	114-0222-00
A29L64	120-1144-00			XFMR,RF:VARIABLE	80009	120-1144-00
A29L88	108-0733-00	B010278		COIL,RF:FIXED,113NH	80009	108-0733-00
A29L89	108-0733-00	B010278		COIL,RF:FIXED,113NH	80009	108-0733-00
A29LR14	108-0212-00			COIL,RF:FIXED,495NH	80009	108-0212-00
A29LR24	108-0212-00			COIL,RF:FIXED,495NH	80009	108-0212-00
A29Q11	151-0195-00			TRANSISTOR:SILICON,NPN	80009	151-0195-00
A29Q20	151-0195-00			TRANSISTOR:SILICON,NPN	80009	151-0195-00
A29Q21	151-0220-00			TRANSISTOR:SILICON,PNP	07263	S036228
A29Q31	151-0220-00			TRANSISTOR:SILICON,PNP	07263	S036228
A29Q71	151-0195-00			TRANSISTOR:SILICON,NPN	80009	151-0195-00
A29Q81	151-0195-00			TRANSISTOR:SILICON,NPN	80009	151-0195-00
A29Q83	151-0438-00			TRANSISTOR:SILICON,PNP,SEL FROM SPS692	80009	151-0438-00
A29Q86	151-0103-00			TRANSISTOR:SILICON,NPN	80009	151-0103-00
A29R01	321-0085-00			RES.,FXD,FILM:75 OHM,1%,0.125W	91637	MFF1816G75R00F
A29R02	321-0085-00			RES.,FXD,FILM:75 OHM,1%,0.125W	91637	MFF1816G75R00F
A29R11	311-1239-00			RES.,VAR,NONWIR:2.5K OHM,10%,0.50W	73138	72-26-0
A29R12	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
A29R14	321-0142-00			RES.,FXD,FILM:294 OHM,1%,0.125W	91637	MFF1816G294R0F
A29R16	321-0091-00			RES.,FXD,FILM:86.6 OHM,1%,0.125W	91637	MFF1816G86R60F
A29R19	321-0088-00			RES.,FXD,FILM:80.6 OHM,1%,0.125W	91637	MFF1816G80R60F
A29R23	321-0211-00			RES.,FXD,FILM:1.54K OHM,1%,0.125W	91637	MFF1816G15400F
A29R24	321-0195-00			RES.,FXD,FILM:1.05K OHM,1%,0.125W	91637	MFF1816G10500F
A29R25	321-0195-00			RES.,FXD,FILM:1.05K OHM,1%,0.125W	91637	MFF1816G10500F
A29R31	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
A29R37	315-0560-00			RES.,FXD,CMPSN:56 OHM,5%,0.25W	01121	CB5605
A29R40	----- -----			(TEST SELECTED, EITHER A29R40 OR A29R43		
A29R40	----- -----			MAY BE USED, NOT BOTH AS THE SAME TIME)		
A29R41	321-0193-00			RES.,FXD,FILM:1K OHM,1%,0.125W		
A29R42	321-0193-00			RES.,FXD,FILM:1K OHM,1%,0.125W		
A29R43	----- -----			(TEST SELECTED, SEE FOOTNOTE ON A29R40)		
A29R60	311-1241-00			RES.,VAR,NONWIR:100K OHM,10%,0.5W	32997	3386X-T07-104
A29R61	321-0306-00			RES.,FXD,FILM:15K OHM,1%,0.125W	91637	MFF1816G15001F
A29R62	321-0312-00			RES.,FXD,FILM:17.4K OHM,1%,0.125W	91637	MFF1816G17401F

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A29R64	321-0097-00			RES.,FXD,FILM:100 OHM,1%,0.125W	91637	MFF1816G100R0F
A29R72	321-0093-00			RES.,FXD,FILM:90.9 OHM,1%,0.125W	91637	MFF1816G90R90F
A29R77	301-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.50W	01121	EB1015
A29R83	321-0222-00			RES.,FXD,FILM:2K OHM,1%,0.125W	91637	MFF1816G20000F
A29R85	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
A29R86	315-0220-00			RES.,FXD,CMPSN:22 OHM,5%,0.25W	01121	CB2205
A29R87	321-0066-00			RES.,FXD,FILM:47.5 OHM,1%,0.125W	91637	MFF1816G47R50F
A29R88	321-0085-00			RES.,FXD,FILM:75 OHM,1%,0.125W	91637	MFF1816G75R00F
A29R89	321-0085-00			RES.,FXD,FILM:75 OHM,1%,0.125W	91637	MFF1816G75R00F
A29R90	321-0302-00			RES.,FXD,FILM:13.7K OHM,1%,0.125W	91637	MFF1816G13701F
A29R91	321-0273-00			RES.,FXD,FILM:6.81K OHM,1%,0.125W	91637	MFF1816G68100F
A29R92	315-0513-00			RES.,FXD,CMPSN:51K OHM,5%,0.25W	01121	CB5135
A29R93	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A29R95	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
A29R97	308-0299-00			RES.,FXD,WW:300 OHM,1%,3W	01686	T2A-300R-F-10
A29T09	120-1149-00			XFMR,RF:TOROID,5 T QUADFILAR	80009	120-1149-00
A29T27	120-1148-00			XFMR,RF:TOROID,5 T,TRIFILAR	80009	120-1148-00
A29U14	156-0130-01			MICROCIRCUIT,LI:MODULATOR/DEMODULATOR	04713	MC1596G
A29VR94	152-0166-00			SEMICOND DEVICE:ZENER,0.4W,6.2V,5%	04713	SZ11738RL

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A30	----- -----			CKT BOARD ASSY:PIN DRIVER/IF ATTEN AMP		
A30	----- -----			(SEE A80 1450 1450-1 OPT 3)		
A30	----- -----			CKT BOARD ASSY:PIN DRIVER/IF ATTEN/MIXER		
A30	----- -----			(SEE A82 OPT 1 & 2)		
A30C87	290-0573-00			CAP.,FXD,ELCTLT:2.7UF,20%,50V	56289	196D275X0050JA1
A30C88	290-0512-00			CAP.,FXD,ELCTLT:22UF,20%,15V	56289	196D226X0015KA1
A30CR17	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A30CR21	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A30CR22	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A30CR27	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A20CR28	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A30CR31	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A30CR32	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A30CR37	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A30CR38	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A30CR41	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A30CR47	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A30CR51	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A30CR52	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A30CR57	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A30CR58	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A30CR61	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A30CR62	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A30CR67	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A30CR68	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A30CR71	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A30CR77	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A30CR81	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A30Q00	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A30Q10	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A30Q19	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A30Q20	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A30Q21	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A30Q28	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A30Q29	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A30Q30	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A30Q31	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A30Q38	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A30Q39	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A30Q40	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A30Q48	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A30Q50	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A30Q51	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A30Q58	151-0219-00			TRANSISTOR:SILICON.PNP	07263	S022650
A30Q59	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A30Q60	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A30Q61	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A30Q68	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A30Q69	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A30Q70	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A30Q79	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A30Q80	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A30Q81	151-0195-00			TRANSISTOR:SILICON,NPN	80009	151-0195-00
A30Q88	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A30Q89	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A30R02	321-0932-03			RES.,FXD,FILM:2.5K OHM,0.25%,0.125W	91637	MFF1816D25000C
A30R12	321-0932-03			RES.,FXD,FILM:2.5K OHM,0.25%,0.125W	91637	MFF1816D25000C
A30R17	315-0275-00			RES.,FXD,CMPSN:2.7M OHM,5%,0.25W	01121	CB2755
A30R21	321-0932-03			RES.,FXD,FILM:2.5K OHM,0.25%,0.125W	91637	MFF1816D25000C
A30R22	321-0816-07			RES.,FXD,FILM:5K OHM,0.1%,0.125W	91637	MFF1816C50000B
A30R27	315-0135-00			RES.,FXD,CMPSN:1.3M OHM,5%,0.25W	01121	CB1355
A30R28	321-0463-00			RES.,FXD,FILM:649K OHM,1%,0.125W	91637	MFF1816G64902F
A30R31	321-0289-00			RES.,FXD,FILM:10K OHM,1%,0.125W	91637	MFF1816G10001F
A30R32	321-0318-00			RES.,FXD,FILM:20K OHM,1%,0.125W	91637	MFF1816G20001F
A30R37	321-0434-00			RES.,FXD,FILM:324K OHM,1%,0.125W	91637	MFF1816G32402F
A30R38	321-0405-00			RES.,FXD,FILM:162K OHM,1%,0.125W	91637	MFF1816G16202F
A30R41	321-0924-07			RES.,FXD,FILM:40K OHM,0.1%,0.125W	91637	MFF1816C40001B
A30R47	321-0376-00			RES.,FXD,FILM:80.6K OHM,1%,0.125W	91637	MFF1816G80601F
A30R51	321-0376-00			RES.,FXD,FILM:80.6K OHM,1%,0.125W	91637	MFF1816G80601F
A30R52	321-0405-00			RES.,FXD,FILM:162K OHM,1%,0.125W	91637	MFF1816G16202F
A30R57	321-0924-07			RES.,FXD,FILM:40K OHM,0.1%,0.125W	91637	MFF1816C40001B
A30R58	321-0318-00			RES.,FXD,FILM:20K OHM,1%,0.125W	91637	MFF1816G20001F
A30R61	321-0434-00			RES.,FXD,FILM:324K OHM,1%,0.125W	91637	MFF1816G32402F
A30R62	321-0463-00			RES.,FXD,FILM:649K OHM,1%,0.125W	91637	MFF1816G64902F
A30R68	321-0816-07			RES.,FXD,FILM:5K OHM,0.1%,0.125W	91637	MFF1816C50000B
A30R67	321-0289-00			RES.,FXD,FILM:10K OHM,1%,0.125W	91637	MFF1816G10001F
A30R71	315-0135-00			RES.,FXD,CMPSN:1.3M OHM,5%,0.25W	01121	CB1355
A30R77	321-0932-03			RES.,FXD,FILM:2.5K OHM,0.25%,0.125W	91637	MFF1816D25000C
A30R81	315-0275-00			RES.,FXD,CMPSN:2.7M OHM,5%,0.25W	01121	CB2755
A30R82	315-0161-00			RES.,FXD,CMPSN:160 OHM,5%,0.25W	01121	CB1615
A30R87	321-0932-03			RES.,FXD,FILM:2.5K OHM,0.25%,0.125W	91637	MFF1816D25000C
A30R88	321-0932-03			RES.,FXD,FILM:2.5K OHM,0.25%,0.125W	91637	MFF1816D25000C
A30R92	321-0227-00			RES.,FXD,FILM:2.26K OHM,1%,0.125W	91637	MFF1816G22600F
A30R93	321-0299-00			RES.,FXD,FILM:12.7K OHM,1%,0.125W	91637	MFF1816G12701F
A30U14	----- -----			(PART OF A80 1450,1450-1 OPT. 3,		
A30U14	----- -----			A82 1450,1450-1 OPT. 3		
A30U14	----- -----			AND A82 OPTION 1 & 2.		
A30U44	----- -----			(SEE FOOTNOTE ON A30U14)		
A30U64	----- -----			(SEE FOOTNOTE ON A30U14)		

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A31	----- -----			CKT BOARD ASSY:PIN DRIVER/IF ATTEN/MIXER		
A31	----- -----			(PART OF A82 OPT 1 & 2)		
A31	----- -----			CKT BOARD ASSY:PIN DRIVER/IF ATTEN AMP		
A31	----- -----			(PART OF A80)		
A31	----- -----			CKT BOARD ASSY:PIN DRIVER/IF ATTEN/MIXER		
A31	----- -----			(PART OF A82 1450 & 1450-1 OPT.3)		
A31C87	290-0573-00			CAP.,FXD,ELCTLT:2.7UF,20%,50V	56289	196D275X0050JA1
A31C88	290-0512-00			CAP.,FXD,ELCTLT:22UF,20%,15V	56289	196D226X0015KA1
A31CR17	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A31CR21	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A31CR22	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A31CR27	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A31CR28	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A31CR31	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A31CR32	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A31CR37	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A31CR38	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A31CR41	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A31CR47	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A31CR51	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A31CR52	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A31CR57	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A31CR58	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A31CR61	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A31CR62	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A31CR67	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A31CR68	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A31CR71	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A31CR77	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A31CR81	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A31Q00	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A31Q10	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A31Q19	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A31Q20	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A31Q21	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A31Q28	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A31Q29	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A31Q30	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A31Q31	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A31Q38	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A31239	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A31Q40	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A31Q48	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A31Q50	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A31Q51	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A31Q58	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A31Q59	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A31Q60	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A31Q61	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A31Q68	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A31Q69	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A31Q70	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A31Q79	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A31Q80	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A31Q81	151-0195-00			TRANSISTOR:SILICON,NPN	80009	151-0195-00
A31Q88	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A31Q89	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A31R02	321-0932-03			RES.,FXD,FILM:2.5K OHM,0.25%,0.125W	91637	MFF1816D25000C
A31R12	321-0932-03			RES.,FXD,FILM:2.5K OHM,0.25%,0.125W	91637	MFF1816D25000C
A31R17	315-0275-00			RES.,FXD,CMPSN:2.7M OHM,5%,0.25W	01121	CB2755
A31R21	321-0932-03			RES.,FXD,FILM:2.5K OHM,0.25%,0.125W	91637	MFF1816D25000C
A31R22	321-0816-07			RES.,FXD,FILM:5K OHM,0.1%,0.125W	91637	MFF1816C50000B
A31R27	315-0135-00			RES.,FXD,CMPSN:1.3M OHM,5%,0.25W	01121	CB1355
A31R28	321-0463-00			RES.,FXD,FILM:649K OHM,1%,0.125W	91637	MFF1816G64902F
A31R31	321-0289-00			RES.,FXD,FILM:10K OHM,1%,0.125W	91637	MFF1816G10001F
A31R32	321-0318-00			RES.,FXD,FILM:20K OHM,1%,0.125W	91637	MFF1816G20001F
A31R37	321-0434-00			RES.,FXD,FILM:324K OHM,1%,0.125W	91637	MFF1816G32402F
A31R38	321-0405-00			RES.,FXD,FILM:162K OHM,1%,0.125W	91637	MFF1816G16202F
A31R41	321-0924-07			RES.,FXD,FILM:40K OHM,0.1%,0.125W	91637	MFF1816C40001B
A31R47	321-0376-00			RES.,FXD,FILM:80.6K OHM,1%,0.125W	91637	MFF1816G80601F
A31R51	321-0376-00			RES.,FXD,FILM:80.6K OHM,1%,0.125W	91637	MFF1816G80601F
A31R52	321-0405-00			RES.,FXD,FILM:162K OHM,1%,0.125W	91637	MFF1816G16202F
A31R57	321-0924-07			RES.,FXD,FILM:40K OHM,0.1%,0.125W	91637	MFF1816C40001B
A31R58	321-0318-00			RES.,FXD,FILM:20K OHM,1%,0.125W	91637	MFF1816G20001F
A31R61	321-0434-00			RES.,FXD,FILM:324K OHM,1%,0.125W	91637	MFF1816G32402F
A31R62	321-0463-00			RES.,FXD,FILM:649K OHM,1%,0.125W	91637	MFF1816G64902F
A31R67	321-0289-00			RES.,FXD,FILM:10K OHM,1%,0.125W	91637	MFF1816G10001F
A31R68	321-0816-07			RES.,FXD,FILM:5K OHM,0.1%,0.125W	91637	MFF1816C50000B
A31R71	315-0135-00			RES.,FXD,CMPSN:1.3M OHM,5%,0.25W	01121	CB1355
A31R77	321-0932-03			RES.,FXD,FILM:2.5K OHM,0.25%,0.125W	91637	MFF1816D25000C
A31R81	315-0275-00			RES.,FXD,CMPSN:2.7M OHM,5%,0.25W	01121	CB2755
A31R82	315-0161-00			RES.,FXD,CMPSN:160 OHM,5%,0.25W	01121	CB1615
A31R87	321-0932-03			RES.,FXD,FILM:2.5K OHM,0.25%,0.125W	91637	MFF1816D25000C
A31R88	321-0932-03			RES.,FXD,FILM:2.5K OHM,0.25%,0.125W	91637	MFF1816D25000C
A31R92	321-0227-00			RES.,FXD,FILM:2.26K OHM,1%,0.125W	91637	MFF1816G22600F
A31R93	321-0299-00			RES.,FXD,FILM:12.7K OHM,1%,0.125W	91637	MFF1816G12701F
A31U14	----- -----			(SEE FOOTNOTE ON A30U14)		
A31U44	----- -----			(SEE FOOTNOTE ON A30U14)		
A31U64	----- -----			(SEE FOOTNOTE ON A30U14)		

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A32	670-5010-00	B000100	B010653	CKT BOARD ASSY:IF INTERFACE	80009	670-5010-00
A32	670-5010-01	B010654		CKT BOARD ASSY:IF INTERFACE	80009	670-5010-01
A32C19	283-0111-00	B000100	B010213	CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A32C23	283-0353-00			CAP.,FXD,CER DI:0.1UF,10%,50V	04222	12105C104KA2075
A32C24	283-0353-00			CAP.,FXD,CER DI:0.1UF,10%,50V	04222	12105C104KA2075
A32C29	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A32C59	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A32C69	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A32L41	120-0382-00			XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
A32L42	120-0382-00			XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
A32Q52	151-0207-00			TRANSISTOR:SILICON,NPN	03508	X32D6191
A32R52	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
A32W20	175-2069-00	B010380	B010653	CABLE ASSY,RF:50 OHM COAX,2.25 L	80009	175-2069-00
A32W20	175-2069-01	B010654		CABLE ASSY,RF:50 OHM COAX,2.25 L	80009	175-2069-00
A32W21	175-2066-00	B010380	B010653	CABLE ASSY,RF:50 OHM COAX,1.25 L	80009	175-2066-00
A32W21	175-2066-01	B010654		CABLE ASSY,RF:50 OHM COAX,1.25 L	80009	175-2066-01
A32W22	175-2067-00	B010380	B010653	CABLE ASSY,RF:50 OHM COAX,1.375 L	80009	175-2067-00
A32W22	175-2067-01	B010654		CABLE ASSY,RF:50 OHM COAX,1.375 L	80009	175-2067-01
A32W23	175-2073-00	B010380	B010653	CABLE ASSY,RF:50 OHM COAX,5.125 L	80009	175-2073-00
A32W23	175-2073-01	B010654		CABLE ASSY,RF:50 OHM COAX,5.125 L	80009	175-2073-01
A32W24	175-2066-00	B010380	B010653	CABLE ASSY,RF:50 OHM COAX,1.25 L	80009	175-2066-00
A32W24	175-2066-01	B010654		CABLE ASSY,RF:50 OHM COAX,1.25 L	80009	175-2066-01
A32W25	175-2074-00	B010380	B010653	CABLE ASSY,RF:50 OHM COAX,5.128 L	80009	175-2074-00
A32W25	175-2074-01	B010654		CABLE ASSY,RF:50 OHM COAX,5.128 L	80009	175-2074-01
A32W26	175-2066-00	B010380	B010653	CABLE ASSY,RF:50 OHM COAX,1.25 L	80009	175-2066-00
A32W26	175-2066-01	B010654		CABLE ASSY,RF:50 OHM COAX,1.25 L	80009	175-2066-01
A32W27	175-2070-00	B010380	B010653	CABLE ASSY,RF:50 OHM COAX,2.75 L	80009	175-2070-00
A32W27	175-2070-01	B010654		CABLE ASSY,RF:50 OHM COAX,2.75 L	80009	175-2070-01
A32W28	175-2067-00	B010380	B010653	CABLE ASSY,RF:50 OHM COAX,1.375 L	80009	175-2067-00
A32W28	175-2067-01	B010654		CABLE ASSY,RF:50 OHM COAX,1.375 L	80009	175-2067-01
A32W29	175-2070-00	B010380	B010653	CABLE ASSY,RF:50 OHM COAX,2.75 L	80009	175-2070-00
A32W29	175-2070-01	B010654		CABLE ASSY,RF:50 OHM COAX,2.75 L	80009	175-2070-01
A32W30	175-2072-00	B010380	B010653	CABLE ASSY,RF:50 OHM COAX,4.625 L	80009	175-2072-00
A32W30	175-2072-01	B010654		CABLE ASSY,RF:50 OHM COAX,4.625 L	80009	175-2072-01
A32W31	175-2068-00	B010380	B010653	CABLE ASSY,RF:50 OHM COAX,2.0 L	80009	175-2068-00
A32W31	175-2068-01	B010654		CABLE ASSY,RF:50 OHM COAX,2.0 L	80009	175-2068-01
A32W32	175-2066-00	B010380	B010653	CABLE ASSY,RF:50 OHM COAX,1.25 L	80009	175-2066-00
A32W32	175-2066-01	B010654		CABLE ASSY,RF:50 OHM COAX,1.25 L	80009	175-2066-01

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A40	670-5011-00			CKT BOARD ASSY:1ST AUDIO MIXER	80009	670-5011-00
A40C15	283-0024-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	72982	8121N083Z5U0104Z
A40C17	283-0024-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	72982	8121N083Z5U0104Z
A40C31	283-0005-00			CAP.,FXD,CER DI:0.01UF,+100-0%,250V	72982	8131N300Z5U0103P
A40C37	283-0005-00			CAP.,FXD,CER DI:0.01UF,+100-0%,250V	72982	8131N300Z5U0103P
A40C44	283-0024-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	72982	8121N083Z5U0104Z
A40C47	290-0782-00			CAP.,FXD,ELCTLT:4.7UF,+75-10%,35V	55680	ULA1V4R7TEA
A40C51	283-0618-00			CAP.,FXD,MICA D:130PF,2%,400V	00853	D155F131G0
A40C52	283-0669-00			CAP.,FXD,MICA D:360PF,1%,500V	00853	D155F361F0
A40C55	283-0005-00			CAP.,FXD,CER DI:0.01UF,+100-0%,250V	72982	8131N300Z5U0103P
A40C56	283-0669-00			CAP.,FXD,MICA D:360PF,1%,500V	00853	D155F361F0
A40C57	283-0005-00			CAP.,FXD,CER DI:0.01UF,+100-0%,250V	72982	8131N300Z5U0103P
A40C59	290-0782-00			CAP.,FXD,ELCTLT:4.7UF,+75-10%,35V	55680	ULA1V4R7TEA
A40C71	283-0005-00	B000100	B010213	CAP.,FXD,CER DI:0.01UF,+100-0%,250V	72982	8131N300Z5U0103P
A40C71	283-0615-00	B010214		CAP.,FXD,MICA D:33PF,5%,500V	00853	D155E330J0
A40C72	283-0615-00	B000100	B010213	CAP.,FXD,MICA D:33PF,5%,500V	00853	D155E330J0
A40C72	283-0005-00	B010214		CAP.,FXD,CER DI:0.01UF,+100-0%,250V	72982	8131N300Z5U0103P
A40C73	283-0203-00	B010213		CAP.,FXD,CER DI:0.47UF,20%,50V	04222	5R305SE474MAA
A40C75	283-0203-00	B000100	B010213	CAP.,FXD,CER DI:0.47UF,20%,50V	04222	5R305SE474MAA
A40C75	283-0615-00	B010214		CAP.,FXD,MICA D:33PF,5%,500V	00853	D155E330J0
A40C76	283-0615-00	B000100	B010213	CAP.,FXD,MICA D:33PF,5%,500V	00853	D155E330J0
A40C78	283-0005-00			CAP.,FXD,CER DI:0.01UF,+100-0%,250V	72982	8131N300Z5U0103P
A40C82	283-0663-00			CAP.,FXD,MICA D:16.8PF,+/-0.5PF,500V	00853	D155C16R8D0
A40C95	283-0177-00			CAP.,FXD,CER DI:1UF,+80-20%,25V	04222	SR302E105ZAA
A40CR25	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A40CR26	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A40CR36	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A40CR45	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A40CR49	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A40CR85	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A40CR96	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A40LR05	108-0212-00			COIL,RF:FIXED,495NH	80009	108-0212-00
A40LR15	108-0212-00			COIL,RF:FIXED,495NH	80009	108-0212-00
A40LR19	108-0212-00	B010120		COIL,RF:FIXED,495NH	80009	108-0212-00
A40L38	120-0382-00			XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
A40L39	120-0382-00			XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
A40L55	108-0606-00			COIL,RF:37NH	80009	108-0606-00
A40L62	114-0246-00			COIL,RF:VARIABLE,700-1100NH	80009	114-0246-00
A40L66	114-0246-00			COIL,RF:VARIABLE,700-1100NH	80009	114-0246-00
A40L92	114-0220-00			COIL,RF:1-3UH,CORE 276-0568-00	80009	114-0220-00
A40Q46	151-0188-00			TRANSISTOR:SILICON,PNP	04713	SPS6868
A40Q72	151-0472-00	B010214		TRANSISTOR:SILICON,NPN	51984	NE41632B
A40Q74	151-0472-00	B000100	B010213	TRANSISTOR:SILICON,NPN	51984	NE41632B
A40Q84	151-0223-00			TRANSISTOR:SILICON,NPN	04713	SPS8026
A40R01	321-0218-00			RES.,FXD,FILM:1.82K OHM,1%,0.125W	91637	MFF1816G18200F
A40R02	321-0143-00			RES.,FXD,FILM:301 OHM,1%,0.125W	91637	MFF1816G301R0F
A40R16	321-0218-00			RES.,FXD,FILM:1.82K OHM,1%,0.125W	91637	MFF1816G18200F
A40R21	321-0088-00			RES.,FXD,FILM:80.6 OHM,1%,0.125W	91637	MFF1816G80R60F
A40R22	321-0088-00			RES.,FXD,FILM:80.6 OHM,1%,0.125W	91637	MFF1816G80R60F
A40R34	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A40R35	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A40R42	315-0270-00			RES.,FXD,CMPSN:27 OHM,5%,0.25W	01121	CB2705
A40R43	315-0432-00			RES.,FXD,CMPSN:4.3K OHM,5%,0.25W	01121	CB4325
A40R44	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A40R47	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A40R48	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A40R54	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A40R55	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A40R57	315-0470-00	B000100	B000119	RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
A40R57	315-0330-00	B010120		RES.,FXD,CMPSN:33 OHM,5%,0.25W	01121	CB3305
A40R58	315-0392-00			RES.,FXD,CMPSN:3.9K OHM,5%,0.25W	01121	CB3925
A40R73	315-0512-00	B000100	B010314	RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
A40R73	315-0511-00	B010315		RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
A40R75	317-0121-00	B000100	B010213	RES.,FXD,CMPSN:120 OHM,5%,0.125W	01121	BB1215
A40R75	315-0202-00	B010214		RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
A40R76	315-0202-00	B000100	B010213	RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
A40R76	315-0200-00	B010214		RES.,FXD,CMPSN:20 OHM,5%,0.25W	01121	CB2005
A40R77	317-0121-00	B000100	B010213	RES.,FXD,CMPSN:120 OHM,5%,0.125W	01121	BB1215
A40R77	315-0121-00	B010214		RES.,FXD,CMPSN:120 OHM,5%,0.25W	01121	CB1215
A40R78	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A40R79	317-0240-00	B000100	B010213	RES.,FXD,CMPSN:24 OHM,5%,0.125W	01121	BB2405
A40R79	315-0121-00	B010214		RES.,FXD,CMPSN:120 OHM,5%,0.25W	01121	CB1215
A40R82	315-0432-00			RES.,FXD,CMPSN:4.3K OHM,5%,0.25W	01121	CB4325
A40R85	315-0474-00			RES.,FXD,CMPSN:470K OHM,5%,0.25W	01121	CB4745
A40R86	315-0474-00			RES.,FXD,CMPSN:470K OHM,5%,0.25W	01121	CB4745
A40R96	315-0102-00	B000100	B010314	RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A40R96	315-0512-00	B010315		RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
A40T19	120-1148-00			XFMR,RF:TOROID,5 T,TRIFILAR	80009	120-1148-00
A40T31	120-1149-00			XFMR,RF:TOROID,5 T QUADFILAR	80009	120-1149-00
A40U12	156-0130-00	B000100	B010782	MICROCIRCUIT,LI:MODULATOR/DEMODULATOR	80009	156-0130-00
A40U12	156-0130-02	B010783		MICROCIRCUIT,LI:MODULATOR/DEMODULATOR,SCRN	04713	SC77162GH
A40U88	156-0067-12			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	01295	UA741CJG
A40VR98	152-0395-00			SEMICOND DEVICE:ZENER,0.4W,4.3V,5%	14552	TD332317

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A41	670-5012-00	B010100	B011036	CKT BOARD ASSY:2ND AUDIO MIXER	80009	670-5012-00
A41	670-5012-03	B011037		CKT BOARD ASSY:2ND AUDIO MIXER	80009	670-5012-03
A41C13	283-0604-00	B000100	B011036	CAP.,FXD,MICA D:304PF,2%,300V	00853	D155F3040G0
A41C13	283-0671-00	B011037		CAP.,FXD,MICA D:164PF,1%,500V	00853	D155F1640F0
A41C17	283-0024-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	72982	8121N083Z5U0104Z
A41C21	283-0024-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	72982	8121N083Z5U0104Z
A41C25	290-0782-00			CAP.,FXD,ELCTLT:4.7UF,+75-10%,35V	55680	ULA1V4R7TEA
A41C26	290-0782-00			CAP.,FXD,ELCTLT:4.7UF,+75-10%,35V	55680	ULA1V4R7TEA
A41C31	283-0604-00	B000100	B011036	CAP.,FXD,MICA D:304PF,2%,300V	00853	D155F3040G0
A41C31	283-0671-00	B011037		CAP.,FXD,MICA D:164PF,1%,500V	00853	D155F1640F0
A41C43	283-0024-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	72982	8121N083Z5U0104Z
A41C44	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
A41C56	283-0003-00	B000100	B000119	CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
A41C56	283-0142-00	B010120		CAP.,FXD,CER DI:0.0027UF,5%,200V	59660	875571YEE0272J
A41C66	290-0782-00			CAP.,FXD,ELCTLT:4.7UF,+75-10%,35V	55680	ULA1V4R7TEA
A41C74	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
A41C75	283-0024-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	72982	8121N083Z5U0104Z
A41C80	283-0670-00			CAP.,FXD,MICA D:375PF,1%,500V	00853	D155F3750F0
A41C81	283-0596-00			CAP.,FXD,MICA D:528PF,1%,300V	00853	D153F5280F0
A41C91	283-0642-00			CAP.,FXD,MICA D:33PF,+/-0.5PF,300V	00853	D10-5E330G
A41C92	283-0024-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	72982	8121N083Z5U0104Z
A41CR75	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A41L24	120-0382-00			XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
A41L26	120-0382-00			XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
A41Q36	151-0302-00			TRANSISTOR:SILICON,NPN	07263	S038487
A41Q44	151-0302-00			TRANSISTOR:SILICON,NPN	07263	S038487
A41Q70	151-0192-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS652	04713	SPS8801
A41R12	321-0202-00			RES.,FXD,FILM:1.24K OHM,1%,0.125W	91637	MFF1816G12400F
A41R13	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A41R14	321-0196-00			RES.,FXD,FILM:1.07K OHM,1%,0.125W	91637	MFF1816G10700F
A41R22	321-0201-00			RES.,FXD,FILM:1.21K OHM,1%,0.125W	91637	MFF1816G12100F
A41R24	315-0621-00			RES.,FXD,CMPSN:620 OHM,5%,0.25W	01121	CB6215
A41R34	315-0621-00			RES.,FXD,CMPSN:620 OHM,5%,0.25W	01121	CB6215
A41R35	315-0162-00			RES.,FXD,CMPSN:1.6K OHM,5%,0.25W	01121	CB1625
A41R41	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A41R42	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A41R44	315-0182-00			RES.,FXD,CMPSN:1.8K OHM,5%,0.25W	01121	CB1825
A41R45	315-0123-00			RES.,FXD,CMPSN:12K OHM,5%,0.25W	01121	CB1235
A41R46	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
A41R51	315-0301-00			RES.,FXD,CMPSN:300 OHM,5%,0.25W	01121	CB3015
A41R54	315-0301-00			RES.,FXD,CMPSN:300 OHM,5%,0.25W	01121	CB3015
A41R56	315-0681-00			RES.,FXD,CMPSN:680 OHM,5%,0.25W	01121	CB6815
A41R58	315-0470-00	B000100	B000119	RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
A41R58	315-0330-00	B010120		RES.,FXD,CMPSN:33 OHM,5%,0.25W	01121	CB3305
A41R61	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A41R62	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A41R64	315-0301-00			RES.,FXD,CMPSN:300 OHM,5%,0.25W	01121	CB3015
A41R65	321-0222-00			RES.,FXD,FILM:2K OHM,1%,0.125W	91637	MFF1816G20000F
A41R71	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
A41R73	315-0511-00			RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
A41R76	315-0511-00			RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
A41R81	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A41R82	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A41R86	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A41R91	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A41T17	120-1142-00			XFMR,RF:INTERCARRIER,POT CORE	80009	120-1142-00
A41T31	120-1142-00			XFMR,RF:INTERCARRIER,POT CORE	80009	120-1142-00
A41U11	156-0033-00			MICROCIRCUIT,LI:RF/IF AMPLIFIER	02735	CA3028A
A41U51	156-0130-00	B000100	B010782	MICROCIRCUIT,LI:MODULATOR/DEMODULATOR	80009	156-0130-00
A41U51	156-0130-02	B010783		MICROCIRCUIT,LI:MODULATOR/DEMODULATOR,SCRN	04713	SC77162GH
A41Y86	158-0128-00			XTAL UNIT,QTZ:5.510204MHZ,0.01%,PARALLEL	33096	PB-1112

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A42	670-5013-00			CKT BOARD ASSY:AUDIO LIMITER	80009	670-5013-00
A42C03	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
A42C05	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
A42C13	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
A42C15	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
A42C44	283-0644-00			CAP.,FXD,MICA D:150PF,1%,500V	00853	D155F151F0
A42C45	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
A42C46	290-0782-00			CAP.,FXD,ELCTLT:4.7UF,+75-10%,35V	55680	ULA1V4R7TEA
A42C47	290-0782-00			CAP.,FXD,ELCTLT:4.7UF,+75-10%,35V	55680	ULA1V4R7TEA
A42C54	283-0626-00			CAP.,FXD,MICA D:1800PF,5%,500V	00853	D195F182J0
A42C63	283-0629-00			CAP.,FXD,MICA D:62PF,1%,500V	00853	D105E620F0
A42C83	283-0645-00			CAP.,FXD,MICA D:790PF,1%,100V	00853	D153F791F0
A42L45	114-0259-00			COIL,RF:150-240UH,CORE NOT REPLACEA	80009	114-0259-00
A42L48	120-0382-00			XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
A42L55	114-0280-00			COIL,RF:12-43UH,CORE 276-0568-00	80009	114-0280-00
A42L75	114-0238-00			COIL,RF:300-470UH,CORE 276-0506-00	80009	114-0238-00
A42L95	114-0310-00			COIL,RF:VARIABLE,22-80UH	80009	114-0310-00
A42R12	321-0135-00			RES.,FXD,FILM:249 OHM,1%,0.125W	91637	MFF1816G249R0F
A42R44	321-0135-00			RES.,FXD,FILM:249 OHM,1%,0.125W	91637	MFF1816G249R0F
A42R45	315-0821-00			RES.,FXD,CMPSN:820 OHM,5%,0.25W	01121	CB8215
A42R47	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
A42R86	321-0164-00			RES.,FXD,FILM:499 OHM,1%,0.125W	91637	MFF1816G499R0F
A42T18	120-1151-00			XFMR,RF:TOROID,6 T QUADFILAR	80009	120-1151-00
A42U15	156-0902-00			MICROCIRCUIT,DI:FM IF AMPL	80009	156-0902-00

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A43	670-5014-00	B000100	B010383	CKT BOARD ASSY:AUDIO DESCRIMINATOR	80009	670-5014-00
A43	670-6024-01	B010384		CKT BOARD ASSY:AUDIO DISCRIMINATOR	80009	670-6024-01
A43C00	290-0776-00			CAP.,FXD,ELCTLT:22UF,+50-10%,10V	55680	ULA1A220TEA
A43C05	283-0596-00			CAP.,FXD,MICA D:528PF,1%,300V	00853	D153F5280F0
A43C07	290-0782-00			CAP.,FXD,ELCTLT:4.7UF,+75-10%,35V	55680	ULA1V4R7TEA
A43C12	290-0770-00			CAP.,FXD,ELCTLT:100UF,+50-10%,25V	56289	502D230
A43C20	290-0776-00	B010134		CAP.,FXD,ELCTLT:22UF,+50-10%,10V	55680	ULA1A220TEA
A43C23	290-0776-00	B000100	B010384	CAP.,FXD,ELCTLT:22UF,+50-10%,10V	55680	ULA1A220TEA
A43C24	290-0776-00	B000100	B010154	CAP.,FXD,ELCTLT:22UF,+50-10%,10V	55680	ULA1A220TEA
A43C24	290-0755-00	B010155		CAP.,FXD,ELCTLT:100UF,+50-10%,10V	55680	ULA1A01TEA
A43C26	290-0782-00			CAP.,FXD,ELCTLT:4.7UF,+75-10%,35V	55680	ULA1V4R7TEA
A43C28	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
A43C34	285-0674-00	B000100	B010384	CAP.,FXD,PLSTC:0.01UF,10%,100V	56289	192P10392
A43C43	285-0674-00	B000100	B010383	CAP.,FXD,PLSTC:0.01UF,10%,100V	56289	192P10392
A43C43	283-0695-00	B010384		CAP.,FXD,MICA D:4440PF,1%,300V	00853	D195F4441F0
A43C48	290-0782-00			CAP.,FXD,ELCTLT:4.7UF,+75-10%,35V	55680	ULA1V4R7TEA
A43C53	285-0674-00	B000100	B010383	CAP.,FXD,PLSTC:0.01UF,10%,100V	56289	192P10392
A43C53	285-0698-00	B010384		CAP.,FXD,PLSTC:0.0082UF,5%,100V	84411	TEK44-82251
A43C55	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
A43C56	283-0024-00	B000100	B010361	CAP.,FXD,CER DI:0.1UF,+80-20%,50V	72982	8121N083Z5U0104Z
A43C56	283-0203-00	B010362		CAP.,FXD,CER DI:0.47UF,20%,50V	04222	5R305SE474MAA
A43C65	285-0674-00	B000100	B010383	CAP.,FXD,PLSTC:0.01UF,10%,100V	56289	192P10392
A43C65	283-0655-00	B010384		CAP.,FXD,MICA D:0.0033UF,1%,500V	00853	D195F332F0
A43C73	290-0782-00			CAP.,FXD,ELCTLT:4.7UF,+75-10%,35V	55680	ULA1V4R7TEA
A43C76	290-0770-00	B010384		CAP.,FXD,ELCTLT:100UF,+50-10%,25V	56289	502D230
A43C78	290-0770-00	B010384		CAP.,FXD,ELCTLT:100UF,+50-10%,25V	56289	502D230
A43C86	290-0770-00	B000100	B010384	CAP.,FXD,ELCTLT:100UF,+50-10%,25V	56289	502D230
A43C88	290-0770-00	B000100	B010384	CAP.,FXD,ELCTLT:100UF,+50-10%,25V	56289	502D230
A43C94	290-0782-00			CAP.,FXD,ELCTLT:4.7UF,+75-10%,35V	55680	ULA1V4R7TEA
A43CR02	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A43CR16	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A43L36	120-0382-00			XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
A43L39	120-0382-00			XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
A43L41	108-0894-00			COIL,RF:FIXED,6.68MH,POT CORE	80009	108-0894-00
A43L61	108-0894-00	B000100	B010383	COIL,RF:FIXED,6.68MH,POT CORE	80009	108-0894-00
A43L61	108-0971-00	B010384		COIL,RF:FIXED,5.24MH	80009	108-0971-00
A43Q08	151-0127-00			TRANSISTOR:SILICON,NPN	07263	S006075
A43Q13	151-0127-00			TRANSISTOR:SILICON,NPN	07263	S006075
A43Q14	151-0188-00			TRANSISTOR:SILICON,PNP	04713	SPS6868
A43Q18	151-0301-00			TRANSISTOR:SILICON,PNP	27014	2N2907A
A43Q19	151-0301-00			TRANSISTOR:SILICON,PNP	27014	2N2907A
A43Q80	151-0302-00			TRANSISTOR:SILICON,NPN	07263	S038487
A43Q82	151-0301-00			TRANSISTOR:SILICON,PNP	27014	2N2907A
A43Q85	151-0302-00			TRANSISTOR:SILICON,NPN	07263	S038487
A43R01	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
A43R02	321-0193-00			RES.,FXD,FILM:1K OHM,1%,0.125W		
A43R03	301-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.5W	01121	EB4715
A43R05	301-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.50W	01121	EB1025
A43R08	315-0751-00			RES.,FXD,CMPSN:750 OHM,5%,0.25W	01121	CB7515
A43R10	315-0751-00			RES.,FXD,CMPSN:750 OHM,5%,0.25W	01121	CB7515
A43R11	321-0226-00			RES.,FXD,FILM:2.21K OHM,1%,0.125W	91637	MFF1816G22100F
A43R16	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A43R17	315-0432-00			RES.,FXD,CMPSN:4.3K OHM,5%,0.25W	01121	CB4325
A43R18	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A43R21	321-0298-00			RES.,FXD,FILM:12.4K OHM,1%,0.125W	91637	MFF1816G12401F
A43R22	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A43R26	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A43R30	311-1241-00			RES.,VAR,NONWIR:100K OHM,10%,0.5W	32997	3386X-T07-104
A43R32	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
A43R33	321-0256-00			RES.,FXD,FILM:4.53K OHM,1%,0.125W	91637	MFF1816G45300F
A43R36	321-0173-00			RES.,FXD,FILM:619 OHM,1%,0.125W	91637	MFF1816G619R0F
A43R44	321-0241-00			RES.,FXD,FILM:3.16K OHM,1%,0.125W	91637	MFF1816G31600F
A43R45	321-0353-00	B000100	B010361	RES.,FXD,FILM:46.4K OHM,1%,0.125W	91637	MFF1816G46401F
A43R45	321-0318-00	B010362		RES.,FXD,FILM:20K OHM,1%,0.125W	91637	MFF1816G20001F
A43R46	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
A43R47	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
A43R55	315-0205-00			RES.,FXD,CMPSN:2M OHM,5%,0.25W	01121	CB2055
A43R58	315-0510-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB5105
A43R71	311-1198-00	B010384		RES.,VAR,NONWIR:20K OHM,20%,0.5W	73138	72-29-0
A43R72	321-0173-00	B000100	B010383	RES.,FXD,FILM:619 OHM,1%,0.125W	91637	MFF1816G619R0F
A43R73	321-0356-00	B000100	B010361	RES.,FXD,FILM:49.9K OHM,1%,0.125W	91637	MFF1816G49901F
A43R73	321-0350-00	B010362		RES.,FXD,FILM:43.2K OHM,1%,0.125W	91637	CMF55116G43201F
A43R74	301-0751-00			RES.,FXD,CMPSN:750 OHM,5%,0.50W	01121	EB7515
A43R76	311-1558-00	B000100	B010384	RES.,VAR,NONWIR:20K OHM,20%,0.50W	73138	91-80-0
A43R78	321-0172-00			RES.,FXD,FILM:604 OHM,1%,0.125W	91637	MFF1816G604R0F
A43R81	315-0154-00	B000100	B010383	RES.,FXD,CMPSN:150K OHM,5%,0.25W	01121	CB1545
A43R81	315-0753-00	B010384		RES.,FXD,CMPSN:75K OHM,5%,0.25W	01121	CB7535
A43R84	315-0103-00	B010384		RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A43R85	315-0101-00	B000100	B010383	RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A43R85	315-0301-00	B010384		RES.,FXD,CMPSN:300 OHM,5%,0.25W	01121	CB3015
A43R86	315-0101-00	B010384		RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A43R90	321-0365-00			RES.,FXD,FILM:61.9K OHM,1%,0.125W	91637	MFF1816G61901F
A43R91	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A43R92	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
A43R97	315-0302-00	B000100	B010383	RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
A43R97	321-0172-00	B010384		RES.,FXD,FILM:604 OHM,1%,0.125W	91637	MFF1816G604R0F
A43U58	156-0067-12			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	01295	UA741CJG
A43VR12	152-0195-00			SEMICOND DEVICE:ZENER,0.4W,5.1V,5%	04713	SZ11755
A43VR47	152-0168-00			SEMICOND DEVICE:ZENER,0.4W,12V,5%	04713	SZG35009K4
A43VR94	152-0166-00			SEMICOND DEVICE:ZENER,0.4W,6.2V,5%	04713	SZ11738RL

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A44	670-5015-01	B000100	B010187	CKT BOARD ASSY:AUDIO INTERFACE	80009	670-5015-01
A44	670-5015-02	B010188		CKT BOARD ASSY:AUDIO INTERFACE	80009	670-5015-02
A44C02	283-0067-00	B010188		CAP.,FXD,CER DI:0.001UF,10%,200V	59660	835-515-Z5D0102K
A44C03	290-0367-00	B010188		CAP.,FXD,ELCTLT:70UF,20%,6V NONPOLARIZED	56289	30D1802
A44C09	290-0525-00	B010188		CAP.,FXD,ELCTLT:4.7UF,20%,50V	56289	196D475X0050KA1
A44C11	290-0367-00	B010120	B010187	CAP.,FXD,ELCTLT:70UF,20%,6V NONPOLARIZED	56289	30D1802
A44C11	283-0111-00	B010188		CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A44C12	283-0142-00	B000100	B000119	CAP.,FXD,CER DI:0.0027UF,5%,200V	59660	875571YEE0272J
A44C12	283-0067-00	B010120	B010187	CAP.,FXD,CER DI:0.001UF,10%,200V	59660	835-515-Z5D0102K
A44C12	283-0111-00	B010188		CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A44C14	290-0770-00	B000100	B010187	CAP.,FXD,ELCTLT:100UF,+50-10%,25V	56289	502D230
A44C15	290-0770-00	B000100	B010187	CAP.,FXD,ELCTLT:100UF,+50-10%,25V	56289	502D230
A44C17	283-0024-00	B000100	B000119	CAP.,FXD,CER DI:0.1UF,+80-20%,50V	72982	8121N083Z5U0104Z
A44C17	283-0111-00	B010120	B010187	CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A44C18	283-0142-00	B000100	B010187	CAP.,FXD,CER DI:0.0027UF,5%,200V	59660	875571YEE0272J
A44C20	283-0111-00	B010120	B010187	CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A44C22	283-0024-00	B000100	B000119	CAP.,FXD,CER DI:0.1UF,+80-20%,50V	72982	8121N083Z5U0104Z
A44C22	283-0111-00	B010120	B010187	CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A44C22	283-0060-00	B010188		CAP.,FXD,CER DI:100PF,5%,200V	59660	855-535U2J101J
A44C23	283-0024-00	B000100	B000119	CAP.,FXD,CER DI:0.1UF,+80-20%,50V	72982	8121N083Z5U0104Z
A44C23	283-0111-00	B010120	B010187	CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A44C24	290-0770-00	B000100	B010187	CAP.,FXD,ELCTLT:100UF,+50-10%,25V	56289	502D230
A44C26	290-0745-00	B010188		CAP.,FXD,ELCTLT:22UF,+50-10%,25V	54473	ECE-A25V22L
A44C27	283-0024-00	B000100	B000119	CAP.,FXD,CER DI:0.1UF,+80-20%,50V	72982	8121N083Z5U0104Z
A44C27	283-0111-00	B010120	B010187	CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A44C27	283-0060-00	B010188		CAP.,FXD,CER DI:100PF,5%,200V	59660	855-535U2J101J
A44C28	290-0745-00	B010188		CAP.,FXD,ELCTLT:22UF,+50-10%,25V	54473	ECE-A25V22L
A44C29	283-0593-00	B000100	B010187	CAP.,FXD,MICA D:0.01UF,1%,100V	00853	D301F103F0
A44C31	283-0111-00	B000100	B010187	CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A44C33	283-0060-00	B000100	B010187	CAP.,FXD,CER DI:100PF,5%,200V	59660	855-535U2J101J
A44C34	283-0111-00	B010188		CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A44C36	283-0111-00	B000100	B010187	CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A44C37	283-0111-00	B010120	B010187	CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A44C38	283-0060-00	B000100	B010187	CAP.,FXD,CER DI:100PF,5%,200V	59660	855-535U2J101J
A44C39	283-0593-00	B010188		CAP.,FXD,MICA D:0.01UF,1%,100V	00853	D301F103F0
A44C40	283-0111-00	B010187		CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A44C41	283-0111-00	B000100	B010187	CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A44C42	290-0522-00	B010188		CAP.,FXD,ELCTLT:1UF,20%,50V	56289	196D105X0050HA1
A44C43	290-0770-00	B000100	B010187	CAP.,FXD,ELCTLT:100UF,+50-10%,25V	56289	502D230
A44C44	290-0770-00	B000100	B010187	CAP.,FXD,ELCTLT:100UF,+50-10%,25V	56289	502D230
A44C44	283-0111-00	B010188		CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A44C46	290-0522-00	B010188		CAP.,FXD,ELCTLT:1UF,20%,50V	56289	196D105X0050HA1
A44C50	283-0111-00	B010188		CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A44C54	283-0111-00	B010188		CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A44C59	290-0745-00	B010188		CAP.,FXD,ELCTLT:22UF,+50-10%,25V	54473	ECE-A25V22L
A44CR01	152-0141-02	B010188		SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A44CR02	152-0141-02	B000100	B010187	SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A44CR12	152-0460-00	B000100	B010187	SEMICOND DEVICE:SILICON,25V,1MA	04713	SCL072
A44CR13	152-0460-00	B010188		SEMICOND DEVICE:SILICON,25V,1MA	04713	SCL072
A44CR14	152-0141-02	B010188		SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A44CR18	152-0460-00	B010188		SEMICOND DEVICE:SILICON,25V,1MA	04713	SCL072
A44CR26	152-0460-00	B000100	B010187	SEMICOND DEVICE:SILICON,25V,1MA	04713	SCL072
A44CR34	152-0141-02	B000100	B010187	SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A44CR55	152-0040-00	B010188		SEMICOND DEVICE:SILICON,600V,1A	15238	LG109

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A44CR57	152-0040-00	B010188		SEMICOND DEVICE:SILICON,600V,1A	15238	LG109
A44F05	159-0021-00	B010188		FUSE,CARTRIDGE:3AG,2A,250V,FAST-BLOW	71400	AGC 2
A44F06	159-0021-00	B010188		FUSE,CARTRIDGE:3AG,2A,250V,FAST-BLOW	71400	AGC 2
A44F48	159-0021-00	B000100	B010187	FUSE,CARTRIDGE:3AG,2A,250V,FAST-BLOW	71400	AGC 2
A44F49	159-0021-00	B000100	B010187	FUSE,CARTRIDGE:3AG,2A,250V,FAST-BLOW	71400	AGC 2
A44Q12	151-0232-00	B010188		TRANSISTOR:SILICON,NPN,DUAL	07263	SP12141
A44Q13	151-0219-00	B010188		TRANSISTOR:SILICON,PNP	07263	S022650
A44Q14	151-0192-00	B010188		TRANSISTOR:SILICON,NPN,SEL FROM MPS652	04713	SPS8801
A44Q16	151-0302-00	B000100	B000119	TRANSISTOR:SILICON,NPN	07263	S038487
A44Q16	151-0192-00	B010120	B010187	TRANSISTOR:SILICON,NPN,SEL FROM MPS652	04713	SPS8801
A44Q16	151-0232-00	B010188		TRANSISTOR:SILICON,NPN,DUAL	07263	SP12141
A44Q17	151-0301-00	B000100	B010187	TRANSISTOR:SILICON,PNP	27014	2N2907A
A44Q17	151-0219-00	B010188		TRANSISTOR:SILICON,PNP	07263	S022650
A44Q23	151-0232-00	B000100	B010187	TRANSISTOR:SILICON,NPN,DUAL	07263	SP12141
A44Q24	151-0192-00	B010188		TRANSISTOR:SILICON,NPN,SEL FROM MPS652	04713	SPS8801
A44Q26	151-0232-00	B000100	B010187	TRANSISTOR:SILICON,NPN,DUAL	07263	SP12141
A44Q28	151-0301-00	B010188		TRANSISTOR:SILICON,PNP	27014	2N2907A
A44Q29	151-0192-00	B010187		TRANSISTOR:SILICON,NPN,SEL FROM MPS652	04713	SPS8801
A44Q33	151-0219-00	B000100	B010187	TRANSISTOR:SILICON,PNP	07263	S022650
A44Q35	151-0192-00	B000100	B010187	TRANSISTOR:SILICON,NPN,SEL FROM MPS652	04713	SPS8801
A44Q36	151-0192-00	B000100	B010187	TRANSISTOR:SILICON,NPN,SEL FROM MPS652	04713	SPS8801
A44Q38	151-0219-00	B000100	B010187	TRANSISTOR:SILICON,PNP	07263	S022650
A44Q52	151-0405-00	B000100	B010782	TRANSISTOR:SILICON,NPN,SEL FROM MJE800	04713	SJE943
A44Q52	151-0405-02	B010783		TRANSISTOR:SILICON,NPN,SCREENED	80009	151-0405-02
A44Q53	151-0323-00	B000100	B010187	TRANSISTOR:SILICON,NPN,SEL FROM MJE521	04713	SJE916
A44Q53	151-0192-00	B010188		TRANSISTOR:SILICON,NPN,SEL FROM MPS652	04713	SPS8801
A44Q54	151-0429-00			TRANSISTOR:SILICON,PNP	04713	SJE957
A44Q55	151-0405-00	B000100	B010782	TRANSISTOR:SILICON,NPN,SEL FROM MJE800	04713	SJE943
A44Q55	151-0405-02	B010783		TRANSISTOR:SILICON,NPN,SCREENED	80009	151-0405-02
A44Q56	151-0323-00	B000100	B010187	TRANSISTOR:SILICON,NPN,SEL FROM MJE521	04713	SJE916
A44Q56	151-0192-00	B010188		TRANSISTOR:SILICON,NPN,SEL FROM MPS652	04713	SPS8801
A44Q57	151-0429-00			TRANSISTOR:SILICON,PNP	04713	SJE957
A44R02	315-0511-00	B010188		RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
A44R03	315-0202-00	B010188		RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
A44R04	315-0472-00	B010188		RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A44R05	311-1560-00	B010188		RES.,VAR,NONWIR:5K OHM,20%,0.50W	73138	91-82-0
A44R06	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
A44R07	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
A44R08	315-0750-00			RES.,FXD,CMPSN:75 OHM,5%,0.25W	01121	CB7505
A44R09	315-0750-00			RES.,FXD,CMPSN:75 OHM,5%,0.25W	01121	CB7505
A44R11	315-0472-00	B010120	B010187	RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A44R12	315-0511-00	B000100	B010187	RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
A44R13	315-0152-00	B000100	B010187	RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
A44R13	315-0112-00	B010188		RES.,FXD,CMPSN:1.1K OHM,5%,0.25W	01121	CB1125
A44R14	311-1560-00	B000100	B010187	RES.,VAR,NONWIR:5K OHM,20%,0.50W	73138	91-82-0
A44R14	321-0105-00	B010188		RES.,FXD,FILM:121 OHM,1%,0.125W	01121	ORD BY DESCR
A44R15	321-0277-00	B000100	B010187	RES.,FXD,FILM:7.5K OHM,1%,0.125W	91637	MFF1816G75000F
A44R15	321-0303-00	B010188		RES.,FXD,FILM:14K OHM,1%,0.125W	91637	MFF1816G14001F
A44R16	321-0222-00	B010188		RES.,FXD,FILM:2K OHM,1%,0.125W	91637	MFF1816G20000F
A44R17	315-0302-00	B000100	B010187	RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
A44R17	315-0112-00	B010188		RES.,FXD,CMPSN:1.1K OHM,5%,0.25W	01121	CB1125
A44R18	315-0472-00	B010120	B010187	RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A44R18	315-0123-00	B010188		RES.,FXD,CMPSN:12K OHM,5%,0.25W	01121	CB1235
A44R19	315-0242-00	B010188		RES.,FXD,CMPSN:2.4K OHM,5%,0.25W	01121	CB2425

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A44R20	315-0202-00	B000100	B010187	RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
A44R20	301-0100-00	B010188		RES.,FXD,CMPSN:10 OHM,5%,0.50W	01121	EB1005
A44R21	315-0112-00	B000100	B010187	RES.,FXD,CMPSN:1.1K OHM,5%,0.25W	01121	CB1125
A44R22	321-0105-00	B000100	B010187	RES.,FXD,FILM:121 OHM,1%,0.125W	01121	ORD BY DESCR
A44R22	315-0220-00	B010188		RES.,FXD,CMPSN:22 OHM,5%,0.25W	01121	CB2205
A44R23	308-0685-00	B000100	B010187	RES.,FXD,WW:1.5 OHM,5%,1W	75042	BW20-1R500J
A44R23	301-0100-00	B010188		RES.,FXD,CMPSN:10 OHM,5%,0.50W	01121	EB1005
A44R24	315-0681-00	B000100	B010187	RES.,FXD,CMPSN:680 OHM,5%,0.25W	01121	CB6815
A44R24	321-0169-00	B010188		RES.,FXD,FILM:562 OHM,1%,0.125W	91637	MFF1816G562R0F
A44R25	321-0105-00	B010188		RES.,FXD,FILM:121 OHM,1%,0.125W	01121	ORD BY DESCR
A44R26	315-0511-00	B000100	B010187	RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
A44R26	321-0300-00	B010188		RES.,FXD,FILM:13K OHM,1%,0.125W	91637	MFF1816G13001F
A44R27	315-0202-00	B000100	B010187	RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
A44R27	308-0685-00	B010188		RES.,FXD,WW:1.5 OHM,5%,1W	75042	BW20-1R500J
A44R28	315-0112-00	B000100	B010187	RES.,FXD,CMPSN:1.1K OHM,5%,0.25W	01121	CB1125
A44R28	315-0220-00	B010188		RES.,FXD,CMPSN:22 OHM,5%,0.25W	01121	CB2205
A44R29	315-0104-00	B000100	B010187	RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
A44R29	315-0152-00	B010188		RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
A44R30	308-0685-00	B000100	B010187	RES.,FXD,WW:1.5 OHM,5%,1W	75042	BW20-1R500J
A44R30	315-0752-00	B010187		RES.,FXD,CMPSN:7.5K OHM,5%,0.25W	01121	CB7525
A44R31	315-0220-00	B000100	B000119	RES.,FXD,CMPSN:22 OHM,5%,0.25W	01121	CB2205
A44R32	315-0220-00	B000100	B010187	RES.,FXD,CMPSN:22 OHM,5%,0.25W	01121	CB2205
A44R32	315-0752-00	B010188		RES.,FXD,CMPSN:7.5K OHM,5%,0.25W	01121	CB7525
A44R33	301-0100-00	B000100	B010187	RES.,FXD,CMPSN:10 OHM,5%,0.50W	01121	EB1005
A44R33	321-0210-00	B010188		RES.,FXD,FILM:1.5K OHM,1%,0.125W	91637	MFF1816G15000F
A44R34	321-0169-00	B000100	B010187	RES.,FXD,FILM:562 OHM,1%,0.125W	91637	MFF1816G562R0F
A44R35	321-0105-00	B000100	B010187	RES.,FXD,FILM:121 OHM,1%,0.125W	01121	ORD BY DESCR
A44R35	308-0685-00	B010188		RES.,FXD,WW:1.5 OHM,5%,1W	75042	BW20-1R500J
A44R36	308-0685-00	B000100	B010187	RES.,FXD,WW:1.5 OHM,5%,1W	75042	BW20-1R500J
A44R36	321-0210-00	B010188		RES.,FXD,FILM:1.5K OHM,1%,0.125W	91637	MFF1816G15000F
A44R37	321-0300-00	B000100	B010187	RES.,FXD,FILM:13K OHM,1%,0.125W	91637	MFF1816G13001F
A44R37	315-0681-00	B010188		RES.,FXD,CMPSN:680 OHM,5%,0.25W	01121	CB6815
A44R38	315-0220-00	B000100	B010187	RES.,FXD,CMPSN:22 OHM,5%,0.25W	01121	CB2205
A44R38	315-0202-00	B010188		RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
A44R39	315-0202-00	B000100	B000119	RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
A44R40	301-0100-00	B000100	B010187	RES.,FXD,CMPSN:10 OHM,5%,0.50W	01121	EB1005
A44R40	308-0685-00	B010188		RES.,FXD,WW:1.5 OHM,5%,1W	75042	BW20-1R500J
A44R41	321-0251-00	B000100	B000119	RES.,FXD,FILM:4.02K OHM,1%,0.125W	91637	MFF1816G40200F
A44R41	315-0752-00	B010120	B010187	RES.,FXD,CMPSN:7.5K OHM,5%,0.25W	01121	CB7525
A44R42	321-0210-00	B000100	B010187	RES.,FXD,FILM:1.5K OHM,1%,0.125W	91637	MFF1816G15000F
A44R42	321-0251-00	B010188		RES.,FXD,FILM:4.02K OHM,1%,0.125W	91637	MFF1816G40200F
A44R43	311-1565-00	B000100	B010187	RES.,VAR,NONWIR:250 OHM,20%,0.50W	73138	91-87-0
A44R44	315-0752-00	B010120	B010187	RES.,FXD,CMPSN:7.5K OHM,5%,0.25W	01121	CB7525
A44R44	308-0685-00	B010188		RES.,FXD,WW:1.5 OHM,5%,1W	75042	BW20-1R500J
A44R45	315-0202-00	B000100	B010187	RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
A44R46	308-0685-00	B000100	B010187	RES.,FXD,WW:1.5 OHM,5%,1W	75042	BW20-1R500J
A44R46	321-0251-00	B010188		RES.,FXD,FILM:4.02K OHM,1%,0.125W	91637	MFF1816G40200F
A44R47	308-0685-00	B000100	B000119	RES.,FXD,WW:1.5 OHM,5%,1W	75042	BW20-1R500J
A44R47	315-0202-00	B010120	B010187	RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
A44R48	321-0210-00	B000100	B000119	RES.,FXD,FILM:1.5K OHM,1%,0.125W	91637	MFF1816G15000F
A44R48	308-0685-00	B010120	B010187	RES.,FXD,WW:1.5 OHM,5%,1W	75042	BW20-1R500J
A44R48	321-0277-00	B010188		RES.,FXD,FILM:7.5K OHM,1%,0.125W	91637	MFF1816G75000F
A44R49	315-0220-00	B000100	B000119	RES.,FXD,CMPSN:22 OHM,5%,0.25W	01121	CB2205

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A44R49	321-0210-00	B010120	B010187	RES.,FXD,FILM:1.5K OHM,1%,0.125W	91637	MFF1816G15000F
A44R49	315-0202-00	B010188		RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
A44R49	311-1565-00	B000100	B000119	RES.,VAR,NONWIR:250 OHM,20%,0.50W	73138	91-87-0
A44R50	308-0685-00	B010120		RES.,FXD,WW:1.5 OHM,5%,1W	75042	BW20-1R500J
A44R51	308-0685-00	B000100	B000119	RES.,FXD,WW:1.5 OHM,5%,1W	75042	BW20-1R500J
A44R52	321-0251-00	B010120	B010187	RES.,FXD,FILM:4.02K OHM,1%,0.125W	91637	MFF1816G40200F
A44R53	311-1565-00	B010188		RES.,VAR,NONWIR:250 OHM,20%,0.50W	73138	91-87-0
A44R54	308-0685-00	B010188		RES.,FXD,WW:1.5 OHM,5%,1W	75042	BW20-1R500J
A44R56	321-0251-00	B000100	B010187	RES.,FXD,FILM:4.02K OHM,1%,0.125W	91637	MFF1816G40200F
A44R56	311-1565-00	B010188		RES.,VAR,NONWIR:250 OHM,20%,0.50W	73138	91-87-0
A44R59	311-1565-00	B010120	B010187	RES.,VAR,NONWIR:250 OHM,20%,0.50W	73138	91-87-0
A44S01	263-0010-00			SWITCH PB ASSY:1 PUSH,7.5MM,W/2 CONTACTS	80009	263-0010-00
A44S04	263-0023-03			SWITCH PB ASSY:3 LCH,7.5MM,6 CONTACTS	80009	263-0023-03
A44S07	263-0015-03			SWITCH PB ASSY:2 LCH,7.5MM,4 CONTACTS	80009	263-0015-03
A44T21	120-1131-00	B000100	B000119	TRANSFORMER,AF:	54937	OBD
A44T21	120-1131-01	B010120		TRANSFORMER,AF:	54937	500-1694

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A50	670-5016-00			CKT BOARD ASSY:REFERENCE CONTROL	80009	670-5016-00
A50C03	283-0663-00	B000100	B000119	CAP.,FXD,MICA D:16.8PF,+/-0.5PF,500V	00853	D155C16R8D0
A50C03	283-0633-00	B010120		CAP.,FXD,MICA D:77PF,1%,100V	00853	D155E770F0
A50C06	283-0649-00			CAP.,FXD,MICA D:105PF,1%,300V	00853	D155F1050F0
A50C14	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A50C16	283-0649-00			CAP.,FXD,MICA D:105PF,1%,300V	00853	D155F1050F0
A50C30	283-0706-00			CAP.,FXD,MICA D:91PF,+/-1PF,500V	00853	D155F910F0
A50C31	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A50C35	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
A50C37	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A50C52	283-0644-00			CAP.,FXD,MICA D:150PF,1%,500V	00853	D155F151F0
A50C54	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
A50C59	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A50C63	283-0706-00			CAP.,FXD,MICA D:91PF,+/-1PF,500V	00853	D155F910F0
A50C67	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A50C71	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A50C78	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A50C83	290-0574-00			CAP.,FXD,ELCTLT:47UF,10%,20V	90201	TDC476K020CL
A50C85	283-0644-00			CAP.,FXD,MICA D:150PF,1%,500V	00853	D155F151F0
A50C87	283-0114-00			CAP.,FXD,CER DI:0.0015UF,5%,200V	59660	805534Y5DO152J
A50C94	290-0535-00			CAP.,FXD,ELCTLT:33UF,20%,10V	56289	196D336X0010KA1
A50C95	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A50CR85	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A50CR91	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A50L15	120-0382-00			XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
A50L52	108-0443-00			COIL,RF:25UH	80009	108-0443-00
A50L62	108-0443-00			COIL,RF:25UH	80009	108-0443-00
A50LR12	108-0543-00			COIL,RF:FIXED,1.1UH	80009	108-0543-00
A50LR13	108-0735-00			COIL,RF:FIXED,560NH	80009	108-0735-00
A50Q02	151-0333-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS918	04713	SPS1752
A50Q35	151-0333-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS918	04713	SPS1752
A50Q70	151-0192-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS652	04713	SPS8801
A50Q80	151-0127-00			TRANSISTOR:SILICON,NPN	07263	S006075
A50Q87	151-0220-00			TRANSISTOR:SILICON,PNP	07263	S036228
A50Q88	151-0192-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS652	04713	SPS8801
A50Q92	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A50R04	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A50R05	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A50R06	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A50R10	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A50R11	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A50R16	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A50R21	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A50R25	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A50R31	315-0511-00			RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
A50R33	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A50R34	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
A50R35	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A50R36	315-0510-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB5105
A50R40	311-1245-00			RES.,VAR,NONWIR:10K OHM,10%,0.50W	73138	72-28-0
A50R43	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
A50R45	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
A50R48	321-0193-00			RES.,FXD,FILM:1K OHM,1%,0.125W		

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A50R49	321-0222-00	B000100	B000119	RES.,FXD,FILM:2K OHM,1%,0.125W	91637	MFF1816G20000F
A50R49	315-0202-00	B010120		RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
A50R50	311-1245-00			RES.,VAR,NONWIR:10K OHM,10%,0.50W	73138	72-28-0
A50R53	321-0301-00			RES.,FXD,FILM:13.3K OHM,1%,0.125W	91637	MFF1816G13301F
A50R56	321-0352-00			RES.,FXD,FILM:45.3K OHM,1%,0.125W	91637	MFF1816G45301F
A50R57	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
A50R60	311-1246-00			RES.,VAR,NONWIR:50K OHM,10%,0.50W	02111	E4A503
A50R63	321-0290-00	B000100	B000119	RES.,FXD,FILM:10.2K OHM,1%,0.125W	91637	CMF55116G10201F
A50R63	321-0225-00	B010120		RES.,FXD,FILM:2.15K OHM,1%,0.125W	91637	MFF1816G21500F
A50R64	321-0359-00			RES.,FXD,FILM:53.6K OHM,1%,0.125W	91637	MFF1816G53601F
A50R66	315-0623-00			RES.,FXD,CMPSN:62K OHM,5%,0.25W	01121	CB6235
A50R70	311-1246-00			RES.,VAR,NONWIR:50K OHM,10%,0.50W	02111	E4A503
A50R72	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A50R73	315-0511-00			RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
A50R74	315-0513-00			RES.,FXD,CMPSN:51K OHM,5%,0.25W	01121	CB5135
A50R75	321-0419-00			RES.,FXD,FILM:226K OHM,1%,0.125W	91637	MFF1816G22602F
A50R76	321-0302-00			RES.,FXD,FILM:13.7K OHM,1%,0.125W	91637	MFF1816G13701F
A50R78	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
A50R81	315-0183-00			RES.,FXD,CMPSN:18K OHM,5%,0.25W	01121	CB1835
A50R83	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A50R84	315-0272-00			RES.,FXD,CMPSN:2.7K OHM,5%,0.25W	01121	CB2725
A50R89	321-0268-00			RES.,FXD,FILM:6.04K OHM,1%,0.125W	91637	MFF1816G60400F
A50R90	315-0270-00			RES.,FXD,CMPSN:27 OHM,5%,0.25W	01121	CB2705
A50R91	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A50R96	321-0262-00	B000100	B000119	RES.,FXD,FILM:5.23K OHM,1%,0.125W	91637	MFF1816G52300F
A50R96	321-0287-00	B010120		RES.,FXD,FILM:9.53K OHM,1%,0.125W	91637	MFF1816G95300F
A50R97	321-0287-00	B000100	B000119	RES.,FXD,FILM:9.53K OHM,1%,0.125W	91637	MFF1816G95300F
A50R97	321-0262-00	B010120		RES.,FXD,FILM:5.23K OHM,1%,0.125W	91637	MFF1816G52300F
A50R98	315-0182-00			RES.,FXD,CMPSN:1.8K OHM,5%,0.25W	01121	CB1825
A50R99	321-0073-00	B010120		RES.,FXD,FILM:56.2 OHM,1%,0.125W	91637	MFF1816G56R20F
A50U23	156-0130-00	B000100	B010782	MICROCIRCUIT,LI:MODULATOR/DEMODULATOR	80009	156-0130-00
A50U23	156-0130-02	B010783		MICROCIRCUIT,LI:MODULATOR/DEMODULATOR,SCRN	04713	SC77162GH
A50U56	156-0158-05	B000100	B010227	MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER	80009	156-0158-05
A50U56	156-0158-04	B010228		MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER	01295	N99320JG
A50Y18	158-0149-00			XTAL UNIT,QTZ:24.25 MHZ,0.01%,SERIES	75378	TX-411

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A52	670-5017-00			CKT BOARD ASSY:PHASE SHIFTER	80009	670-5017-00
A52C01	281-0209-00			CAP.,VAR,AIR DI:1.3-5.4PF,250V	74970	187-0303-105
A52C03	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A52C08	281-0511-00			CAP.,FXD,CER DI:22PF,+/-2.2PF,500V	59660	301-000C0G0220K
A52C10	283-0645-00			CAP.,FXD,MICA D:790PF,1%,100V	00853	D153F791F0
A52C11	283-0060-00			CAP.,FXD,CER DI:100PF,5%,200V	59660	855-535U2J101J
A52C16	281-0504-00			CAP.,FXD,CER DI:10PF,+/-1PF,500V	04222	7001-COG-100F
A52C21	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A52C22	283-0672-00			CAP.,FXD,MICA D:200PF,1%,500V	00853	D155F2010F0
A52C45	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A52C46	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A52C47	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A52C48	283-0204-00			CAP.,FXD,CER DI:0.01UF,20%,50V	96733	R2676
A52C66	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A52C78	281-0504-00			CAP.,FXD,CER DI:10PF,+/-1PF,500V	04222	7001-COG-100F
A52C83	283-0204-00			CAP.,FXD,CER DI:0.01UF,20%,50V	96733	R2676
A52C88	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A52C89	283-0204-00			CAP.,FXD,CER DI:0.01UF,20%,50V	96733	R2676
A52C90	283-0634-00			CAP.,FXD,MICA D:65PF,1%,100V	00853	D155E650F0
A52C94	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A52C95	283-0634-00			CAP.,FXD,MICA D:65PF,1%,100V	00853	D155E650F0
A52CR10	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A52CR32	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A52CR33	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A52CR42	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A52CR41	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A52CR43	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A52CR44	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A52CR45	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A52CR50	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A52CR51	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A52CR52	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A52CR54	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A52CR55	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A52CR63	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A52CR64	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A52CR65	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A52E37	276-0543-00	B010120		SHLD BEAD,ELEK:FERRITE	80009	276-0543-00
A52L20	108-0103-00			COIL,RF:FIXED,2.45UH	80009	108-0103-00
A52L98	114-0246-00			COIL,RF:VARIABLE,700-1100NH	80009	114-0246-00
A52LR47	108-0212-00			COIL,RF:FIXED,495NH	80009	108-0212-00
A52Q03	151-1005-00	B000100	B010647	TRANSISTOR:SILICON,JFE,N-CHANNEL	27014	F55037
A52Q03	151-1005-02	B010648		TRANSISTOR:SILICON,JFE,N-CHANNEL,CHK	80009	151-1005-02
A52Q15	151-0192-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS652	04713	SPS8801
A52Q17	151-0220-00			TRANSISTOR:SILICON,PNP	07263	S036228
A52Q18	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A52Q37	151-0472-00			TRANSISTOR:SILICON,NPN	51984	NE41632B
A52Q38	151-0325-00	B000100	B010647	TRANSISTOR:SILICON,PNP,SEL FROM 2N4258	80009	151-0325-00
A52Q38	151-0325-01	B010648		TRANSISTOR:SILICON,PNP,SEL	80009	151-0325-01
A52Q59	151-0325-00	B000100	B010647	TRANSISTOR:SILICON,PNP,SEL FROM 2N4258	80009	151-0325-00
A52Q59	151-0325-01	B010648		TRANSISTOR:SILICON,PNP,SEL	80009	151-0325-01
A52R03	315-0396-00			RES.,FXD,CMPSN:39M OHM,5%,0.25W	01121	CB3965
A52R05	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A52R06	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A52R07	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
A52R09	315-0154-00			RES.,FXD,CMPSN:150K OHM,5%,0.25W	01121	CB1545
A52R13	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A52R14	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A52R15	315-0183-00			RES.,FXD,CMPSN:18K OHM,5%,0.25W	01121	CB1835
A52R18	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
A52R19	315-0303-00			RES.,FXD,CMPSN:30K OHM,5%,0.25W	01121	CB3035
A52R25	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
A52R26	301-0301-00			RES.,FXD,CMPSN:300 OHM,5%,0.5W	01121	EB3015
A52R34	315-0123-00			RES.,FXD,CMPSN:12K OHM,5%,0.25W	01121	CB1235
A52R36	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A52R49	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A52R52	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A52R53	321-0220-00			RES.,FXD,FILM:1.91K OHM,1%,0.125W	91637	MFF1816G19100F
A52R55	321-0243-00			RES.,FXD,FILM:3.32K OHM,1%,0.125W	91637	MFF1816G33200F
A52R56	321-0262-00			RES.,FXD,FILM:5.23K OHM,1%,0.125W	91637	MFF1816G52300F
A52R57	315-0681-00			RES.,FXD,CMPSN:680 OHM,5%,0.25W	01121	CB6815
A52R58	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
A52R61	321-0266-00			RES.,FXD,FILM:5.76K OHM,1%,0.125W	91637	MFF1816G57600F
A52R62	321-0291-00			RES.,FXD,FILM:10.5K OHM,1%,0.125W	91637	MFF1816G10501F
A52R63	321-0193-00			RES.,FXD,FILM:1K OHM,1%,0.125W		
A52R70	321-0211-00			RES.,FXD,FILM:1.54K OHM,1%,0.125W	91637	MFF1816G15400F
A52R71	321-0266-00			RES.,FXD,FILM:5.76K OHM,1%,0.125W	91637	MFF1816G57600F
A52R72	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A52R73	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A52R74	321-0210-00			RES.,FXD,FILM:1.5K OHM,1%,0.125W	91637	MFF1816G15000F
A52R76	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A52R77	321-0269-00			RES.,FXD,FILM:6.19K OHM,1%,0.125W	91637	MFF1816G61900F
A52R82	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
A52R84	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
A52R91	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A52R92	315-0910-00			RES.,FXD,CMPSN:91 OHM,5%,0.25W	01121	CB9105
A52R93	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
A52R94	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A52R96	315-0910-00			RES.,FXD,CMPSN:91 OHM,5%,0.25W	01121	CB9105
A52T58	120-1150-00			XFMR,RF:TOROID,7 T TRIFILAR	80009	120-1150-00
A52U22	156-0770-00			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	27014	LF356H
A52U81	156-0130-00	B000100	B010782	MICROCIRCUIT,LI:MODULATOR/DEMODULATOR	80009	156-0130-00
A52U81	156-0130-02	B010783		MICROCIRCUIT,LI:MODULATOR/DEMODULATOR,SCRN	04713	SC77162GH
A52U84	156-0130-00	B000100	B010782	MICROCIRCUIT,LI:MODULATOR/DEMODULATOR	80009	156-0130-00
A52U84	156-0130-02	B010783		MICROCIRCUIT,LI:MODULATOR/DEMODULATOR,SCRN	04713	SC77162GH

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A53	670-5019-00			CKT BOARD ASSY:CONVERTER PHASE LOCK	80009	670-5019-00
A53C09	283-0114-00			CAP.,FXD,CER DI:0.0015UF,5%,200V	59660	805534Y5DO152J
A53C15	283-0210-00			CAP.,FXD,CER DI:0.0056UF,20%,50V	56289	273C9
A53C33	290-0782-00	B000100	B000119	CAP.,FXD,ELCTLT:4.7UF,+75-10%,35V	55680	ULA1V4R7TEA
A53C33	290-0525-00	B010120		CAP.,FXD,ELCTLT:4.7UF,20%,50V	56289	196D475X0050KA1
A53C34	283-0210-00			CAP.,FXD,CER DI:0.0056UF,20%,50V	56289	273C9
A53C44	283-0142-00			CAP.,FXD,CER DI:0.0027UF,5%,200V	59660	875571YEE0272J
A53C45	283-0142-00			CAP.,FXD,CER DI:0.0027UF,5%,200V	59660	875571YEE0272J
A53C46	283-0616-00			CAP.,FXD,MICA D:75PF,5%,500V	00853	D155E750J0
A53C51	283-0616-00			CAP.,FXD,MICA D:75PF,5%,500V	00853	D155E750J0
A53C57	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A53C64	283-0598-00			CAP.,FXD,MICA D:253PF,5%,300V	09023	CD15FD(253)J03
A53C66	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A53C70	283-0644-00			CAP.,FXD,MICA D:150PF,1%,500V	00853	D155F151F0
A53C71	283-0598-00			CAP.,FXD,MICA D:253PF,5%,300V	09023	CD15FD(253)J03
A53C72	283-0644-00			CAP.,FXD,MICA D:150PF,1%,500V	00853	D155F151F0
A53C75	283-0644-00			CAP.,FXD,MICA D:150PF,1%,500V	00853	D155F151F0
A53C76	283-0644-00			CAP.,FXD,MICA D:150PF,1%,500V	00853	D155F151F0
A53C79	283-0600-00			CAP.,FXD,MICA D:43PF,5%,500V	00853	D105E430J0
A53C84	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A53C88	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A53C92	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	59821	SDDH69J203Z
A53C94	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	59821	SDDH69J203Z
A53C99	283-0600-00			CAP.,FXD,MICA D:43PF,5%,500V	00853	D105E430J0
A53CR07	152-0141-02	B000100	B000119	SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A53CR19	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A53CR23	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A53CR24	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A53CR26	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A53CR42	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A53CR47	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A53L54	108-0226-00			COIL,RF:100UH	76493	DWG B4257
A53L55	108-0226-00			COIL,RF:100UH	76493	DWG B4257
A53L61	108-0226-00			COIL,RF:100UH	76493	DWG B4257
A53L62	108-0226-00			COIL,RF:100UH	76493	DWG B4257
A53L63	108-0226-00			COIL,RF:100UH	76493	DWG B4257
A53L66	108-0226-00			COIL,RF:100UH	76493	DWG B4257
A53L70	108-0226-00			COIL,RF:100UH	76493	DWG B4257
A53L72	108-0226-00			COIL,RF:100UH	76493	DWG B4257
A53L89	108-0683-00			COIL,RF:FIXED,900NH	80009	108-0683-00
A53Q08	151-0216-00			TRANSISTOR:SILICON,PNP	04713	SPS8803
A53Q18	151-0192-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS652	04713	SPS8801
A53Q32	151-0192-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS652	04713	SPS8801
A53Q42	151-0220-00			TRANSISTOR:SILICON,PNP	07263	S036228
A53Q43	151-0188-00			TRANSISTOR:SILICON,PNP	04713	SPS6868
A53Q45	151-0192-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS652	04713	SPS8801
A53Q46	151-0192-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS652	04713	SPS8801
A53Q50	151-0192-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS652	04713	SPS8801
A53Q53	151-0192-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS652	04713	SPS8801
A53Q94	151-0333-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS918	04713	SPS1752
A53Q95	151-0333-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS918	04713	SPS1752
A53R00	321-0243-00			RES.,FXD,FILM:3.32K OHM,1%,0.125W	91637	MFF1816G33200F
A53R01	315-0204-00			RES.,FXD,CMPSN:200K OHM,5%,0.25W	01121	CB2045
A53R04	315-0204-00			RES.,FXD,CMPSN:200K OHM,5%,0.25W	01121	CB2045

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A53R05	315-0122-00			RES.,FXD,CMPSN:1.2K OHM,5%,0.25W	01121	CB1225
A53R06	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
A53R07	315-0333-00	B000100	B000119	RES.,FXD,CMPSN:33K OHM,5%,0.25W	01121	CB3335
A53R07	315-0123-00	B010120		RES.,FXD,CMPSN:12K OHM,5%,0.25W	01121	CB1235
A53R09	315-0105-00			RES.,FXD,CMPSN:1M OHM,5%,0.25W	01121	CB1055
A53R10	321-0169-00			RES.,FXD,FILM:562 OHM,1%,0.125W	91637	MFF1816G562R0F
A53R11	315-0680-00			RES.,FXD,CMPSN:68 OHM,5%,0.25W	01121	CB6805
A53R13	315-0563-00	B010120		RES.,FXD,CMPSN:56K OHM,5%,0.25W	01121	CB5635
A53R14	315-0563-00			RES.,FXD,CMPSN:56K OHM,5%,0.25W	01121	CB5635
A53R15	315-0563-00	B000100	B000119	RES.,FXD,CMPSN:56K OHM,5%,0.25W	01121	CB5635
A53R15	315-0104-00	B010120		RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
A53R16	315-0104-00	B000100	B000119	RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
A53R16	315-0333-00	B010120		RES.,FXD,CMPSN:33K OHM,5%,0.25W	01121	CB3335
A53R17	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
A53R18	315-0335-00			RES.,FXD,CMPSN:3.3M OHM,5%,0.25W	01121	CB3355
A53R19	315-0392-00			RES.,FXD,CMPSN:3.9K OHM,5%,0.25W	01121	CB3925
A53R20	315-0221-00			RES.,FXD,CMPSN:220 OHM,5%,0.25W	01121	CB2215
A53R22	315-0751-00			RES.,FXD,CMPSN:750 OHM,5%,0.25W	01121	CB7515
A53R23	315-0680-00			RES.,FXD,CMPSN:68 OHM,5%,0.25W	01121	CB6805
A53R25	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A53R26	315-0105-00			RES.,FXD,CMPSN:1M OHM,5%,0.25W	01121	CB1055
A53R27	315-0273-00			RES.,FXD,CMPSN:27K OHM,5%,0.25W	01121	CB2735
A53R31	315-0221-00			RES.,FXD,CMPSN:220 OHM,5%,0.25W	01121	CB2215
A53R35	321-0239-00			RES.,FXD,FILM:3.01K OHM,1%,0.125W	91637	MFF1816G30100F
A53R36	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A53R37	321-0239-00			RES.,FXD,FILM:3.01K OHM,1%,0.125W	91637	MFF1816G30100F
A53R40	321-0243-00			RES.,FXD,FILM:3.32K OHM,1%,0.125W	91637	MFF1816G33200F
A53R41	321-0169-00			RES.,FXD,FILM:562 OHM,1%,0.125W	91637	MFF1816G562R0F
A53R42	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A53R46	315-0122-00			RES.,FXD,CMPSN:1.2K OHM,5%,0.25W	01121	CB1225
A53R47	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
A53R48	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
A53R49	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
A53R51	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
A53R53	315-0122-00			RES.,FXD,CMPSN:1.2K OHM,5%,0.25W	01121	CB1225
A53R55	315-0625-00			RES.,FXD,CMPSN:6.2M OHM,5%,0.25W	01121	CB6255
A53R56	315-0205-00			RES.,FXD,CMPSN:2M OHM,5%,0.25W	01121	CB2055
A53R76	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A53R73	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A53R74	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
A53R81	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A53R83	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A53R84	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A53R85	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
A53R86	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A53R87	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
A53R91	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
A53R92	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
A53R96	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
A53R97	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A53R98	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
A53U03	156-0356-00	B000100	B010647	MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0356-00
A53R03	156-0356-01	B010648		MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	02735	CA3080TX

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A53U13	156-0356-00	B000100	B010647	MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0356-00
A53U13	156-0356-01	B010648		MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	02735	CA3080TX
A53U59	156-0158-05	B000100	B010227	MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER	80009	156-0158-05
A53U59	156-0158-04	B010228		MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER	01295	N99320JG
A53U81	156-0130-00	B000100	B010782	MICROCIRCUIT,LI:MODULATOR/DEMODULATOR	80009	156-0130-00
A53U81	156-0130-02	B010783		MICROCIRCUIT,LI:MODULATOR/DEMODULATOR,SCRN	04713	SC77162GH
A53U87	156-0130-00	B000100	B010782	MICROCIRCUIT,LI:MODULATOR/DEMODULATOR	80009	156-0130-00
A53U87	156-0130-02	B010783		MICROCIRCUIT,LI:MODULATOR/DEMODULATOR,SCRN	04713	SC77162GH

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A54	670-5020-00			CKT BOARD ASSY:DETECTOR LO SWITCH	80009	670-5020-00
A54C10	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A54C13	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	59821	SDDH69J203Z
A54C21	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	59821	SDDH69J203Z
A54C34	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A54C36	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	59821	SDDH69J203Z
A54C43	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A54C44	283-0065-00			CAP.,FXD,CER DI:0.001UF,5%,100V	59660	0835-591Y5EO102J
A54C51	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	59821	SDDH69J203Z
A54C56	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A54C58	281-0509-00			CAP.,FXD,CER DI:15PF,+/-1.5PF,500V	59660	301-000C0G0150K
A54C63	283-0615-00			CAP.,FXD,MICA D:33PF,5%,500V	00853	D155E330J0
A54C65	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	59821	SDDH69J203Z
A54C66	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A54C67	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A54C71	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	59821	SDDH69J203Z
A54C75	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	59821	SDDH69J203Z
A54C85	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	59821	SDDH69J203Z
A54CR14	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A54CR15	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A54CR22	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A54CR41	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A54CR59	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A54CR61	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A54CR63	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A54CR78	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A54L31	120-0382-00			XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
A54LR63	108-0212-00			COIL,RF:FIXED,495NH	80009	108-0212-00
A54LR66	108-0520-00			COIL,RF:2.2UH (WOUND ON 10 OHM RES)	80009	108-0520-00
A54Q03	151-0192-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS652	04713	SPS8801
A54Q04	151-0164-00			TRANSISTOR:PNP,SI,TO-92	04713	2N2907A
A54Q17	151-0192-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS652	04713	SPS8801
A54Q19	151-0220-00			TRANSISTOR:SILICON,PNP	07263	S036228
A54Q34	151-0472-00			TRANSISTOR:SILICON,NPN	51984	NE41632B
A54Q35	151-0472-00			TRANSISTOR:SILICON,NPN	51984	NE41632B
A54Q62	151-0325-00	B000100	B010647	TRANSISTOR:SILICON,PNP,SEL FROM 2N4258	80009	151-0325-00
A54Q62	151-0325-01	B010648		TRANSISTOR:SILICON,PNP,SEL	80009	151-0325-01
A54Q72	151-0472-00			TRANSISTOR:SILICON,NPN	51984	NE41632B
A54R02	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A54R03	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A54R05	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A54R06	315-0753-00			RES.,FXD,CMPSN:75K OHM,5%,0.25W	01121	CB7535
A54R07	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A54R08	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A54R12	301-0511-00			RES.,FXD,CMPSN:510 OHM,5%,0.50W	01121	EB5115
A54R13	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
A54R19	315-0133-00			RES.,FXD,CMPSN:13K OHM,5%,0.25W	01121	CB1335
A54R23	315-0432-00			RES.,FXD,CMPSN:4.3K OHM,5%,0.25W	01121	CB4325
A54R24	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A54R25	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A54R31	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
A54R32	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A54R33	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
A54R34	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A54R36	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A54R38	315-0510-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB5105
A54R43	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
A54R48	301-0122-00			RES.,FXD,CMPSN:1.2K OHM,5%,0.5W	01121	EB1225
A54R50	301-0511-00			RES.,FXD,CMPSN:510 OHM,5%,0.50W	01121	EB5115
A54R55	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A54R58	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
A54R60	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A54R64	315-0680-00			RES.,FXD,CMPSN:68 OHM,5%,0.25W	01121	CB6805
A54R65	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
A54R70	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
A54R73	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
A54R75	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
A54R83	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
A54R84	301-0301-00			RES.,FXD,CMPSN:300 OHM,5%,0.5W	01121	EB3015
A54R86	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A55	670-5007-00			CKT BOARD ASSY:IF LIMITER	80009	670-5007-00
A55C05	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
A55C09	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
A55C14	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
A55C18	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
A55C24	283-0688-00			CAP.,FXD,MICA D:464PF,1%,300V	00853	D153F4640F0
A55C34	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
A55C44	283-0688-00			CAP.,FXD,MICA D:464PF,1%,300V	00853	D153F4640F0
A55C54	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
A55C64	283-0688-00			CAP.,FXD,MICA D:464PF,1%,300V	00853	D153F4640F0
A55C69	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
A55C74	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
A55C84	283-0688-00			CAP.,FXD,MICA D:464PF,1%,300V	00853	D153F4640F0
A55C87	290-0745-00			CAP.,FXD,ELCTLT:22UF,+50-10%,25V	54473	ECE-A25V22L
A55C89	283-0203-00			CAP.,FXD,CER DI:0.47UF,20%,50V	04222	5R305SE474MAA
A55C94	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
A55C98	290-0745-00			CAP.,FXD,ELCTLT:22UF,+50-10%,25V	54473	ECE-A25V22L
A55CR11	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A55CR31	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A55CR61	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A55CR81	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A55L05	108-0262-00			COIL,RF:FIXED,510NH	80009	108-0262-00
A55L15	108-0736-00			COIL,RF:810NH	80009	108-0736-00
A55L17	120-0382-00			XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
A55L35	108-0262-00			COIL,RF:FIXED,510NH	80009	108-0262-00
A55L37	120-0382-00			XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
A55L45	108-0736-00			COIL,RF:810NH	80009	108-0736-00
A55L54	108-0262-00			COIL,RF:FIXED,510NH	80009	108-0262-00
A55L57	120-0382-00			XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
A55L58	120-0382-00			XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
A55L64	108-0736-00			COIL,RF:810NH	80009	108-0736-00
A55L75	108-0262-00			COIL,RF:FIXED,510NH	80009	108-0262-00
A55L76	120-0382-00			XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
A55L84	108-0736-00			COIL,RF:810NH	80009	108-0736-00
A55Q02	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
A55Q09	151-0472-00	B000100	B010500	TRANSISTOR:SILICON,NPN	51984	NE41632B
A55Q09	151-0472-02	B010501		TRANSISTOR:SILICON,NPN	80009	151-0472-02
A55Q15	151-0472-00	B000100	B010500	TRANSISTOR:SILICON,NPN	51984	NE41632B
A55Q15	151-0472-02	B010501		TRANSISTOR:SILICON,NPN	80009	151-0472-02
A55Q21	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
A55Q22	151-0472-00	B000100	B010500	TRANSISTOR:SILICON,NPN	51984	NE41632B
A55Q22	151-0472-02	B010501		TRANSISTOR:SILICON,NPN	80009	151-0472-02
A55Q32	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
A55Q35	151-0472-00	B000100	B010500	TRANSISTOR:SILICON,NPN	51984	NE41632B
A55Q35	151-0472-02	B010501		TRANSISTOR:SILICON,NPN	80009	151-0472-02
A55Q41	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
A55Q43	151-0472-00	B000100	B010500	TRANSISTOR:SILICON,NPN	51984	NE41632B
A55Q43	151-0472-02	B010501		TRANSISTOR:SILICON,NPN	80009	151-0472-02
A55Q52	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
A55Q55	151-0472-00	B000100	B010500	TRANSISTOR:SILICON,NPN	51984	NE41632B
A55Q55	151-0472-02	B010501		TRANSISTOR:SILICON,NPN	80009	151-0472-02
A55Q60	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
A55Q62	151-0472-00	B000100	B010500	TRANSISTOR:SILICON,NPN	51984	NE41632B
A55Q62	151-0472-02	B010501		TRANSISTOR:SILICON,NPN	80009	151-0472-02

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A55Q75	151-0472-00	B000100	B010500	TRANSISTOR:SILICON,NPN	51984	NE41632B
A55Q75	151-0472-02	B010501		TRANSISTOR:SILICON,NPN	80009	151-0472-02
A55Q81	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
A55Q90	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
A55Q92	151-0472-00	B000100	B010501	TRANSISTOR:SILICON,NPN	51984	NE41632B
A55Q92	151-0472-02	B010501		TRANSISTOR:SILICON,NPN	80009	151-0472-02
A55R00	311-1280-00			RES.,VAR,NONWIR:1K OHM,10%,0.50W	32997	3329W-L58-102
A55R01	315-0362-00			RES.,FXD,CMPSN:3.6K OHM,5%,0.25W	01121	CB3625
A55R02	321-0126-00			RES.,FXD,FILM:200 OHM,1%,0.125W	91637	MFF1816G200R0F
A55R04	321-0147-00			RES.,FXD,FILM:332 OHM,1%,0.125W	91637	MFF1816G332R0F
A55R05	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A55R08	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A55R11	321-0126-00			RES.,FXD,FILM:200 OHM,1%,0.125W	91637	MFF1816G200R0F
A55R12	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
A55R15	321-0051-00			RES.,FXD,FILM:33.2 OHM,1%,0.125W	91637	MFF1816G33R20F
A55R18	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A55R19	321-0068-00			RES.,FXD,FILM:49.9 OHM,1%,0.125W	91637	MFF1816G49R90F
A55R21	315-0362-00			RES.,FXD,CMPSN:3.6K OHM,5%,0.25W	01121	CB3625
A55R22	321-0126-00			RES.,FXD,FILM:200 OHM,1%,0.125W	91637	MFF1816G200R0F
A55R24	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A55R25	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
A55R26	321-0147-00			RES.,FXD,FILM:332 OHM,1%,0.125W	91637	MFF1816G332R0F
A55R30	311-1280-00			RES.,VAR,NONWIR:1K OHM,10%,0.50W	32997	3329W-L58-102
A55R31	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
A55R34	321-0051-00			RES.,FXD,FILM:33.2 OHM,1%,0.125W	91637	MFF1816G33R20F
A55R35	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A55R41	321-0126-00			RES.,FXD,FILM:200 OHM,1%,0.125W	91637	MFF1816G200R0F
A55R45	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A55R46	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
A55R47	321-0147-00			RES.,FXD,FILM:332 OHM,1%,0.125W	91637	MFF1816G332R0F
A55R50	311-1280-00			RES.,VAR,NONWIR:1K OHM,10%,0.50W	32997	3329W-L58-102
A55R51	315-0362-00			RES.,FXD,CMPSN:3.6K OHM,5%,0.25W	01121	CB3625
A55R52	321-0126-00			RES.,FXD,FILM:200 OHM,1%,0.125W	91637	MFF1816G200R0F
A55R57	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A55R61	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
A55R62	321-0126-00			RES.,FXD,FILM:200 OHM,1%,0.125W	91637	MFF1816G200R0F
A55R64	321-0051-00			RES.,FXD,FILM:33.2 OHM,1%,0.125W	91637	MFF1816G33R20F
A55R65	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
A55R70	321-0239-00			RES.,FXD,FILM:3.01K OHM,1%,0.125W	91637	MFF1816G30100F
A55R71	321-0126-00			RES.,FXD,FILM:200 OHM,1%,0.125W	91637	MFF1816G200R0F
A55R73	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A55R74	321-0147-00			RES.,FXD,FILM:332 OHM,1%,0.125W	91637	MFF1816G332R0F
A55R75	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A55R80	321-0164-00			RES.,FXD,FILM:499 OHM,1%,0.125W	91637	MFF1816G499R0F
A55R81	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
A55R82	321-0126-00			RES.,FXD,FILM:200 OHM,1%,0.125W	91637	MFF1816G200R0F
A55R84	321-0051-00			RES.,FXD,FILM:33.2 OHM,1%,0.125W	91637	MFF1816G33R20F
A55R94	315-0510-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB5105
A55R95	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A56	670-5194-00			CKT BOARD ASSY:CONVERTER CONTROL	80009	670-5194-00
A56	----- -----			(1450 & 1450-1 OPT. 3)		
A56	670-5194-01			CKT BOARD ASSY:CONVERTER CONTROL	80009	670-5194-01
A56	----- -----			(OPTION 1 ONLY)		
A56	670-5194-02			CKT BOARD ASSY:CONVERTER CONTROL	80009	670-5194-02
A56	----- -----			(OPTION 2 ONLY)		
A56C03	283-0637-00			CAP.,FXD,MICA D:20PF,2.5%,100V	00853	D151E200D0
A56C05	283-0600-00	B000100	B000119	CAP.,FXD,MICA D:43PF,5%,500V	00853	D105E430J0
A56C05	283-0615-00	B010120		CAP.,FXD,MICA D:33PF,5%,500V	00853	D155E330J0
A56C13	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A56C15	283-0600-00	B000100	B000119	CAP.,FXD,MICA D:43PF,5%,500V	00853	D105E430J0
A56C15	283-0615-00	B010120		CAP.,FXD,MICA D:33PF,5%,500V	00853	D155E330J0
A56C30	283-0706-00			CAP.,FXD,MICA D:91PF,+/-1PF,500V	00853	D155F910F0
A56C31	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A56C35	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
A56C37	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A56C46	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A56C51	283-0644-00			CAP.,FXD,MICA D:150PF,1%,500V	00853	D155F151F0
A56C61	283-0706-00			CAP.,FXD,MICA D:91PF,+/-1PF,500V	00853	D155F910F0
A56C70	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A56C73	283-0644-00			CAP.,FXD,MICA D:150PF,1%,500V	00853	D155F151F0
A56C76	283-0114-00			CAP.,FXD,CER DI:0.0015UF,5%,200V	59660	805534Y5DO152J
A56C78	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A56C84	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A56C85	290-0535-00			CAP.,FXD,ELCTLT:33UF,20%,10V	56289	196D336X0010KA1
A56C88	290-0745-00			CAP.,FXD,ELCTLT:22UF,+50-10%,25V	54473	ECE-A25V22L
A56CR62	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A56CR94	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A56L13	108-0436-00			COIL,RF:FIXED,240NH	80009	108-0436-00
A56L13	----- -----			(1450,1450-1 OPT. 3)		
A56L13	108-0413-00			COIL,RF:FIXED,0.4UH	80009	108-0413-00
A56L13	----- -----			(OPTION 1 & 2)		
A56L14	120-0382-00			XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
A56L50	108-0443-00			COIL,RF:25UH	80009	108-0443-00
A56L60	108-0443-00			COIL,RF:25UH	80009	108-0443-00
A56L76	120-0382-00	B010120		XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
A56L78	120-0382-00	B000100	B000119	XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
A56LR03	108-0408-00	B010120		COIL,RF:100NH	80009	108-0408-00
A56LR03	----- -----			(OPTION 1 & 2)		
A56LR03	108-0408-00	B010120		COIL,RF:100NH	80009	108-0408-00
A56LR03	----- -----			(1450,1450-1 OPT. 3)		
A56LR12	108-0543-00			COIL,RF:FIXED,1.1UH	80009	108-0543-00
A56Q02	151-0333-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS918	04713	SPS1752
A56Q35	151-0333-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS918	04713	SPS1752
A56Q55	151-1054-00	B000100	B010768	TRANSISTOR:SILICON,JFE,N-CHANNEL,DUAL	17856	DN1114
A56Q55	151-1054-01	B010769		TRANSISTOR:SILICON,JFE,N-CHANNEL,DUAL	22229	FD1764
A56Q74	151-0192-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS652	04713	SPS8801
A56Q91	151-0192-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS652	04713	SPS8801
A56Q92	151-0127-00			TRANSISTOR:SILICON,NPN	07263	S006075
A56Q95	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A56R03	315-0470-00	B000100	B000119	RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
A56R04	315-0511-00			RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
A56R06	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A56R10	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A56R11	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A56R16	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A56R21	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A56R25	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A56R31	315-0511-00			RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
A56R32	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A56R34	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
A56R35	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A56R36	315-0510-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB5105
A56R43	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
A56R45	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
A56R52	315-0511-00			RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
A56R53	315-0511-00			RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
A56R63	321-0322-00			RES.,FXD,FILM:22.1K OHM,1%,0.125W	91637	MFF1816G22101F
A56R71	315-0272-00			RES.,FXD,CMPSN:2.7K OHM,5%,0.25W	01121	CB2725
A56R72	315-0513-00			RES.,FXD,CMPSN:51K OHM,5%,0.25W	01121	CB5135
A56R73	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A56R76	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
A56R80	315-0511-00			RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
A56R81	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A56R82	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A56R83	315-0183-00			RES.,FXD,CMPSN:18K OHM,5%,0.25W	01121	CB1835
A56R84	315-0242-00			RES.,FXD,CMPSN:2.4K OHM,5%,0.25W	01121	CB2425
A56R85	321-0073-00	B010120		RES.,FXD,FILM:56.2 OHM,1%,0.125W	91637	MFF1816G56R20F
A56R87	321-0287-00			RES.,FXD,FILM:9.53K OHM,1%,0.125W	91637	MFF1816G95300F
A56R88	321-0262-00			RES.,FXD,FILM:5.23K OHM,1%,0.125W	91637	MFF1816G52300F
A56U22	156-0130-00	B000100	B010782	MICROCIRCUIT,LI:MODULATOR/DEMODULATOR	80009	156-0130-00
A56U22	156-0130-02	B010783		MICROCIRCUIT,LI:MODULATOR/DEMODULATOR,SCRN	04713	SC77162GH
A56Y18	158-0150-00			XTAL UNIT,QTZ:70MHZ,0.01%,SERIES	75378	OBD
A56Y18	----- -----			(1450,1450-1 OPT. 3)		
A56Y18	158-0164-00			XTAL UNIT,QTZ:61.250MHZ,0.01%,SERIES	75378	TX-508
A56Y18	----- -----			(OPTION 1 ONLY)		
A56Y18	158-0178-00			XTAL UNIT QTZ:63.150MHZ,0.01%	33096	OBD
A56Y18	----- -----			(OPTION 2 ONLY)		

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A57	670-5196-00	B000100	B010119	CKT BOARD ASSY:CONVERTER OSCILLATOR	80009	670-5196-00
A57	----- -----			(1450 ONLY)		
A57	670-5196-01	B000100	B000119	CKT BOARD ASSY:CONVERTER OSC	80009	670-5196-01
A57	----- -----			(OPTION 1 & 2)		
A57	670-5196-03	B010120		CKT BOARD ASSY:CONVERTER OSC	80009	670-5196-03
A57	----- -----			(OPTION 1 & 2)		
A57	670-5196-02	B010120		CKT BOARD ASSY:CONVERTER OSC	80009	670-5196-02
A57	----- -----			(1450,1450-1 OPTION 3)		
A57C06	281-0651-00			CAP.,FXD,CER DI:47PF,5%,200V	59660	0374018T2H0 470J
A57C07	281-0552-00			CAP.,FXD,CER DI:25PF,5%,500V	59660	301-000P2G0250J
A57C08	283-0602-00			CAP.,FXD,MICA D:53PF,5%,300V	00853	D155E53OJ0
A57C14	283-0618-00	B000100	B000119	CAP.,FXD,MICA D:130PF,2%,400V	00853	D155F131G0
A57C14	283-0630-00	B010120		CAP.,FXD,MICA D:110PF,1%,100V	00853	D155F111F0
A57C15	283-0618-00	B000100	B000119	CAP.,FXD,MICA D:130PF,2%,400V	00853	D155F131G0
A57C15	283-0630-00	B010120		CAP.,FXD,MICA D:110PF,1%,100V	00853	D155F111F0
A57C21	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A57C25	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A57C28	283-0067-00			CAP.,FXD,CER DI:0.001UF,10%,200V	59660	835-515-Z5D0102K
A57C30	283-0633-00			CAP.,FXD,MICA D:77PF,1%,100V	00853	D155E770F0
A57C30	----- -----			(OPTION 1 & 2)		
A57C30	283-0629-00			CAP.,FXD,MICA D:62PF,1%,500V	00853	D105E620F0
A57C30	----- -----			(1450,1450-1 OPT. 3)		
A57C36	283-0114-00			CAP.,FXD,CER DI:0.0015UF,5%,200V	59660	805534Y5DO152J
A57C45	290-0745-00			CAP.,FXD,ELCTLT:22UF,+50-10%,25V	54473	ECE-A25V22L
A57C52	283-0635-00			CAP.,FXD,MICA D:51PF,1%,100V	00853	D151E510F0
A57C52	----- -----			(1450,1450-1 OPT. 3)		
A57C53	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A57C55	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
A57C63	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
A57C66	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A57C73	283-0644-00	B010120		CAP.,FXD,MICA D:150PF,1%,500V	00853	D155F151F0
A57C73	----- -----			(1450,1450-1 OPT. 3)		
A57C73	283-0646-00	B010120		CAP.,FXD,MICA D:170PF,1%,100V	00853	D155F171F0
A57C73	----- -----			(OPTION 1 & 2)		
A57C77	283-0635-00	B010120		CAP.,FXD,MICA D:51PF,1%,100V	00853	D151E510F0
A57C83	283-0706-00	B010120		CAP.,FXD,MICA D:91PF,+/-1PF,500V	00853	D155F910F0
A57C83	----- -----			(OPTION 1 & 2)		
A57C83	283-0634-00	B010120		CAP.,FXD,MICA D:65PF,1%,100V	00853	D155E650F0
A57C83	----- -----			(1450,1450-1 OPT. 3)		
A57C84	281-0092-00	B010120		CAP.,VAR,CER DI:9-35PF,200V	59660	538-011 D9-35
A57CR09	152-0665-00			SEMICOND DEVICE:SILICON,VVC,30V	04713	SMV1344
A57L03	114-0333-00	B000100	B000119	COIL,RF:310-600NH,CORE 276-0506-00	80009	114-0333-00
A57L03	114-0370-00	B010120		COIL,RF:VARIABLE,220 TO 400NH	80009	114-0370-00
A57L03	114-0333-00	B000100	B000119	COIL,RF:310-600NH,CORE 276-0506-00	80009	114-0333-00
A57L03	114-0373-00	B010120		COIL,RF:VARIABLE,290-540NH	80009	114-0373-00
A57L03	----- -----			(OPTION 1& 2)		
A57L18	108-0897-00			COIL,RF:FIXED,220UH	80009	108-0897-00
A57L31	108-0262-00			COIL,RF:FIXED,510NH	80009	108-0262-00
A57L41	114-0302-00			COIL,RF:VARIABLE,140-290NH	80009	114-0302-00
A57L82	108-0260-00	B010120		COIL,RF:98NH	80009	108-0260-00
A57L86	108-0413-00	B010120		COIL,RF:FIXED,0.4UH	80009	108-0413-00
A57LR13	108-0408-00			COIL,RF:100NH	80009	108-0408-00
A57LR56	108-0520-00			COIL,RF:2.2UH (WOUND ON 10 OHM RES)	80009	108-0520-00
A57LR72	108-0328-00	B010120		COIL,RF:0.3UH	80009	108-0328-00

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A57Q22	151-0333-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS918	04713	SPS1752
A57Q32	151-0333-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS918	04713	SPS1752
A57Q35	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A57Q62	151-0472-00	B000100	B010500	TRANSISTOR:SILICON,NPN	51984	NE41632B
A57Q62	151-0472-02	B010501		TRANSISTOR:SILICON,NPN	80009	151-0472-02
A57R11	315-0272-00			RES.,FXD,CMPSN:2.7K OHM,5%,0.25W	01121	CB2725
A57R12	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
A57R21	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
A57R23	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
A57R26	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A57R27	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
A57R46	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A57R53	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
A57R61	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
A57R65	315-0620-00			RES.,FXD,CMPSN:62 OHM,5%,0.25W	01121	CB6205
A57R71	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
A57R73	315-0180-00			RES.,FXD,CMPSN:18 OHM,5%,0.25W	01121	CB1805
A57R74	315-0301-00			RES.,FXD,CMPSN:300 OHM,5%,0.25W	01121	CB3015
A57R75	315-0271-00			RES.,FXD,CMPSN:270 OHM,5%,0.25W	01121	CB2715
A57T72	120-0871-00	B000100	B000119	XFMR,TOROID:4 TURNS,TRIFILAR	80009	120-0871-00

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A58	670-5195-00			CKT BOARD ASSY:PHASE LOCK SWITCH	80009	670-5195-00
A58C67	283-0024-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	72982	8121N083Z5U0104Z
A58C68	283-0024-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	72982	8121N083Z5U0104Z
A58C69	283-0024-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	72982	8121N083Z5U0104Z
A58C76	283-0024-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	72982	8121N083Z5U0104Z
A58C77	283-0024-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	72982	8121N083Z5U0104Z
A58C79	283-0024-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	72982	8121N083Z5U0104Z
A58C89	283-0024-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	72982	8121N083Z5U0104Z
A58CR51	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A58CR76	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A58CR77	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A58CR78	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A58CR79	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A58L67	120-0382-00			XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
A58L74	120-0382-00			XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
A58L75	120-0382-00			XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
A58R52	315-0203-00			RES.,FXD,CMPSN:20K OHM,5%,0.25W	01121	CB2035
A58R53	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A58R57	301-0681-00			RES.,FXD,CMPSN:680 OHM,5%,0.50W	01121	EB6815
A58R61	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
A58R67	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
A58R68	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
A58R76	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A58R77	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A58S22	263-0021-01			SWITCH PB ASSY:4 LCH,7.5MM,6 CONTACTS	80009	263-0021-01
A58S25	263-0015-04			SWITCH PB ASSY:2 LCH,7.5MM,2 CONTACTS	80009	263-0015-04
A58S28	263-0015-05			SWITCH PB ASSY:2 LCH,7.5MM,2 CONTACTS	80009	263-0015-05
A59	670-5021-00	B000100	B01118	CKT BOARD ASSY:PHASE LOCK INTERFACE	80009	670-5021-00
A59	670-5021-01	B011188		CKT BOARD ASSY:PHASE LOCK INTERFACE	80009	670-5021-01
A59C04	290-0745-00			CAP.,FXD,ELCTLT:22UF,+50-10%,25V	54473	ECE-A25V22L
A59C06	290-0745-00			CAP.,FXD,ELCTLT:22UF,+50-10%,25V	54473	ECE-A25V22L
A59C55	283-0353-00			CAP.,FXD,CER DI:0.1UF,10%,50V	04222	12105C104KA2075
A59C56	283-0353-00			CAP.,FXD,CER DI:0.1UF,10%,50V	04222	12105C104KA2075
A59C57	283-0353-00			CAP.,FXD,CER DI:0.1UF,10%,50V	04222	12105C104KA2075
A59W50	175-2076-00			CABLE ASSY,RF:50 OHM COAX,3.375 L	80009	175-2076-00
A59W52	175-2077-00			CABLE ASSY,RF:50 OHM COAX,6.5 L	80009	175-2077-00
A59W56	175-2075-00			CABLE ASSY,RF:50 OHM COAX,3.375 L	80009	175-2075-00
A59W57	175-2107-00			CABLE ASSY,RF:50 OHM COAX,3.3 L	80009	175-2107-00

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A60	670-5022-00	B000100	B010213	CKT BOARD ASSY:AGC LOGIC INTERFACE	80009	670-5022-00
A60	670-5022-01	B010214		CKT BOARD ASSY:AGC LOGIC INTERFACE	80009	670-5022-01
A60C00	283-0191-00			CAP.,FXD,CER DI:0.022UF,20%,50V	72982	8121N075Z5U0223M
A60C05	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A60C11	283-0191-00			CAP.,FXD,CER DI:0.022UF,20%,50V	72982	8121N075Z5U0223M
A60C12	290-0770-00			CAP.,FXD,ELCTLT:100UF,+50-10%,25V	56289	502D230
A60C13	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A60C14	283-0028-00			CAP.,FXD,CER DI:0.0022UF,20%,50V	59660	0805585Y5SO222M
A60C15	283-0177-00	B000100	B010119	CAP.,FXD,CER DI:1UF,+80-20%,25V	04222	SR302E105ZAA
A60C15	283-0103-00	B010120		CAP.,FXD,CER DI:180PF,5%,500V	59660	831-518-Z5D0181J
A60C16	283-0203-00			CAP.,FXD,CER DI:0.47UF,20%,50V	04222	5R305SE474MAA
A60C17	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
A60C20	283-0672-00			CAP.,FXD,MICA D:200PF,1%,500V	00853	D155F2010F0
A60C21	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A60C22	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
A60C23	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
A60C24	283-0177-00			CAP.,FXD,CER DI:1UF,+80-20%,25V	04222	SR302E105ZAA
A60C25	283-0111-00	B000100	B010184	CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A60C25	283-0167-00	B010185		CAP.,FXD,CER DI:0.1UF,10%,100V	72982	8131N145X5R0104K
A60C26	283-0598-00	B000100	B010274	CAP.,FXD,MICA D:253PF,5%,300V	09023	CD15FD(253)J03
A60C26	283-0785-00	B010275		CAP.,FXD,MICA D:250PF,1%,500V	09023	CD15FD251F03
A60C27	283-0191-00			CAP.,FXD,CER DI:0.022UF,20%,50V	72982	8121N075Z5U0223M
A60C28	283-0598-00			CAP.,FXD,MICA D:253PF,5%,300V	09023	CD15FD(253)J03
A60C29	283-0728-00			CAP.,FXD,MICA D:120PF,1%,500V	00853	D155F121F0
A60C30	283-0114-00			CAP.,FXD,CER DI:0.0015UF,5%,200V	59660	805534Y5DO152J
A60C31	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A60C38	283-0601-00			CAP.,FXD,MICA D:22PF,10%,300V	00853	D155E220K0
A60C39	283-0032-00			CAP.,FXD,CER DI:470PF,5%,500V	59660	0831085Z5E00471J
A60C40	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A60C42	285-0598-00			CAP.,FXD,PLSTC:0.01UF,5%,100V	19396	DU490B103J
A60C43	283-0032-00			CAP.,FXD,CER DI:470PF,5%,500V	59660	0831085Z5E00471J
A60C45	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A60C54	283-0142-00			CAP.,FXD,CER DI:0.0027UF,5%,200V	59660	875571YEE0272J
A60C60	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A60C61	283-0659-00			CAP.,FXD,MICA D:1160PF,2%,500V	00853	D195F1161G0
A60C62	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A60C63	283-0689-00			CAP.,FXD,MICA D:550PF,1%,300V	00853	D153F551F0
A60C67	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A60C68	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A60C71	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A60C78	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A60C88	290-0526-00			CAP.,FXD,ELCTLT:6.8UF,20%,6V	90201	TDC685M00NLE
A60C97	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A60C98	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A60CR02	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A60CR09	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A60CR16	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A60CR18	152-0141-02	B000100	B010214	SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A60CR19	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A60CR32	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A60CR34	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A60CR37	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A60CR54	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A60CR55	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A60CR61	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A60CR62	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A60CR63	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A60CR64	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A60CR65	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A60CR66	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A60CR67	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A60CR68	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A60CR69	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A60CR77	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A60CR78	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A60CR79	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A60CR88	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A60CR98	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A60K97	148-0081-00			RELAY,ARMATURE:28DC	77342	R10-E2434-1
A60L28	114-0311-00			COIL,RF:65-190UH,CORE 276-0568-00	80009	114-0311-00
A60L38	114-0219-00			COIL,RF:VARIABLE,43-130UH	80009	114-0219-00
A60Q09	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A60Q11	151-0301-00			TRANSISTOR:SILICON,PNP	27014	2N2907A
A60Q12	151-0302-00			TRANSISTOR:SILICON,NPN	07263	S038487
A60Q13	151-0302-00	B000100	B010213	TRANSISTOR:SILICON,NPN	07263	S038487
A60Q13	151-0219-00	B010214		TRANSISTOR:SILICON,PNP	07263	S022650
A60Q14	151-1005-00	B000100	B010647	TRANSISTOR:SILICON,JFE,N-CHANNEL	27014	F55037
A60Q14	151-1005-02	B010648		TRANSISTOR:SILICON,JFE,N-CHANNEL,CHK	80009	151-1005-02
A60Q17	151-0302-00			TRANSISTOR:SILICON,NPN	07263	S038487
A60Q20	151-0127-00			TRANSISTOR:SILICON,NPN	07263	S006075
A60Q36	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A60Q37	151-0219-00			TRANSISTOR:SILICON,PNP	07263	S022650
A60Q51	151-0302-00			TRANSISTOR:SILICON,NPN	07263	S038487
A60Q89	151-0281-00			TRANSISTOR:SILICON,NPN	03508	X16P4039
A60R01	315-0472-00	B010120		RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A60R02	321-0328-00	B000100	B000119	RES.,FXD,FILM:25.5K OHM,1%,0.125W	91637	MFF1816G25501F
A60R02	321-0318-00	B010120	B010274	RES.,FXD,FILM:20K OHM,1%,0.125W	91637	MFF1816G20001F
A60R02	321-0321-00	B010275		RES.,FXD,FILM:21.5K OHM,1%,0.125W	91637	MFF1816G21501F
A60R03	321-0466-00	B000100	B010274	RES.,FXD,FILM:698K OHM,1%,0.125W	91637	CMF55116G69802F
A60R03	321-0891-00	B010275		RES.,FXD,FILM:800K OHM,1%,0.125W	91637	MFF1816G80002F
A60R04	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A60R05	315-0102-00	B000100	B000119	RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A60R05	315-0104-00	B010120		RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
A60R06	321-0289-00			RES.,FXD,FILM:10K OHM,1%,0.125W	91637	MFF1816G10001F
A60R07	321-0172-00			RES.,FXD,FILM:604 OHM,1%,0.125W	91637	MFF1816G604R0F
A60R08	321-0193-00			RES.,FXD,FILM:1K OHM,1%,0.125W		
A60R09	321-0281-00			RES.,FXD,FILM:8.25K OHM,1%,0.125W	91637	MFF1816G82500F
A60R10	315-0472-00	B000100	B000119	RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A60R10	315-0752-00	B010120		RES.,FXD,CMPSN:7.5K OHM,5%,0.25W	01121	CB7525
A60R11	315-0752-00	B000100	B000119	RES.,FXD,CMPSN:7.5K OHM,5%,0.25W	01121	CB7525
A60R11	315-0470-00	B010120	B010144	RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
A60R11	315-0100-00	B010145		RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
A60R12	315-0470-00	B000100	B000119	RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
A60R12	301-0201-00	B010120		RES.,FXD,CMPSN:200 OHM,5%,0.5W	01121	EB2015
A60R13	315-0152-00	B000100	B010213	RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
A60R13	315-0203-00	B010214		RES.,FXD,CMPSN:20K OHM,5%,0.25W	01121	CB2035
A60R14	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A60R15	315-0154-00	B000100	B010274	RES.,FXD,CMPSN:150K OHM,5%,0.25W	01121	CB1545
A60R15	315-0683-00	B010275		RES.,FXD,CMPSN:68K OHM,5%,0.25W	01121	CB6835
A60R16	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
A60R17	311-1226-00			RES.,VAR,NONWIR:2.5K OHM,20%,0.50W	32997	3386F-T04-252
A60R18	315-0102-00	B000100	B000119	RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A60R18	315-0103-00	B010120		RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A60R19	321-0260-00			RES.,FXD,FILM:4.99K OHM,1%,0.125W	91637	MFF1816G49900F
A60R20	321-0263-00			RES.,FXD,FILM:5.36K OHM,1%,0.125W	91637	MFF1816G53600F
A60R21	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
A60R22	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
A60R23	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A60R24	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A60R25	315-0684-00			RES.,FXD,CMPSN:680K OHM,5%,0.25W	01121	CB6845
A60R26	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
A60R27	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A60R28	315-0331-00			RES.,FXD,CMPSN:330 OHM,5%,0.25W	01121	CB3315
A60R29	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A60R30	315-0205-00			RES.,FXD,CMPSN:2M OHM,5%,0.25W	01121	CB2055
A60R31	315-0392-00			RES.,FXD,CMPSN:3.9K OHM,5%,0.25W	01121	CB3925
A60R32	321-0241-00			RES.,FXD,FILM:3.16K OHM,1%,0.125W	91637	MFF1816G31600F
A60R33	311-1228-00			RES.,VAR,NONWIR:10K OHM,20%,0.50W	32997	3386F-T04-103
A60R34	321-0335-00			RES.,FXD,FILM:30.1K OHM,1%,0.125W	91637	CMF55116G30101F
A60R35	321-0414-00			RES.,FXD,FILM:200K OHM,1%,0.125W	91637	MFF1816G20002F
A60R36	321-0239-00			RES.,FXD,FILM:3.01K OHM,1%,0.125W	91637	MFF1816G30100F
A60R37	321-0176-00			RES.,FXD,FILM:665 OHM,1%,0.125W	91637	MFF1816G665R0F
A60R38	321-0191-00			RES.,FXD,FILM:953 OHM,1%,0.125W	91637	MFF1816G953R0F
A60R39	315-0303-00			RES.,FXD,CMPSN:30K OHM,5%,0.25W	01121	CB3035
A60R40	315-0122-00			RES.,FXD,CMPSN:1.2K OHM,5%,0.25W	01121	CB1225
A60R41	321-0357-00			RES.,FXD,FILM:51.1K OHM,1%,0.125W	91637	MFF1816G51101F
A60R42	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
A60R43	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
A60R44	131-0566-00			BUS CONDUCTOR:DUMMY RES,2.375,22 AWG	57668	JWW-0200E0
A60R45	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
A60R46	315-0204-00			RES.,FXD,CMPSN:200K OHM,5%,0.25W	01121	CB2045
A60R47	311-1228-00			RES.,VAR,NONWIR:10K OHM,20%,0.50W	32997	3386F-T04-103
A60R48	321-0210-00			RES.,FXD,FILM:1.5K OHM,1%,0.125W	91637	MFF1816G15000F
A60R49	321-0193-00			RES.,FXD,FILM:1K OHM,1%,0.125W		
A60R50	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A60R51	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A60R52	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A60R53	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
A60R54	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
A60R55	311-1223-00			RES.,VAR,NONWIR:TRMR,250 OHM,0.5W	73138	72-5-0
A60R56	321-0276-00			RES.,FXD,FILM:7.32K OHM,1%,0.125W	91637	MFF1816G73200F
A60R57	311-1223-00			RES.,VAR,NONWIR:TRMR,250 OHM,0.5W	73138	72-5-0
A60R58	311-1224-00			RES.,VAR,NONWIR:500 OHM,20%,0.50W	32997	3386F-T04-501
A60R59	311-1224-00			RES.,VAR,NONWIR:500 OHM,20%,0.50W	32997	3386F-T04-501
A60R60	321-0344-00			RES.,FXD,FILM:37.4K OHM,1%,0.125W	91637	MFF1816G37401F
A60R61	321-0344-00			RES.,FXD,FILM:37.4K OHM,1%,0.125W	91637	MFF1816G37401F
A60R62	315-0331-00			RES.,FXD,CMPSN:330 OHM,5%,0.25W	01121	CB3315
A60R63	315-0106-00	B000100	B000119	RES.,FXD,CMPSN:10M OHM,5%,0.25W	01121	CB1065
A60R63	315-0105-00	B010120		RES.,FXD,CMPSN:1M OHM,5%,0.25W	01121	CB1055
A60R64	321-0603-07			RES.,FXD,FILM:15K OHM,0.1%,0.125W	91637	MFF1816C15001B
A60R65	321-0685-00			RES.,FXD,FILM:30K OHM,0.5%,0.125W	91637	MFF1816D30001D

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A60R66	321-0720-03			RES.,FXD,FILM:60K OHM,0.25%,0.125W	91637	MFF1816D60001C
A60R67	321-0393-00			RES.,FXD,FILM:121K OHM,1%,0.125W	91637	CMF55116G12102F
A60R68	321-0422-00			RES.,FXD,FILM:243K OHM,1%,0.125W	91637	MFF1816G24302F
A60R69	321-0451-00			RES.,FXD,FILM:487K OHM,1%,0.125W	91637	CMF55116G48702F
A60R73	315-0473-00	B000100	B010213	RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
A60R73	315-0134-00	B010214		RES.,FXD,CMPSN:130K OHM,5%,0.25W	01121	CB1345
A60R74	315-0395-00	B010120		RES.,FXD,CMPSN:3.9M OHM,5%,0.25W	01121	CB3955
A60R75	315-0152-00	B010214		RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
A60R76	315-0152-00	B010214		RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
A60R76	315-0303-00			RES.,FXD,CMPSN:30K OHM,5%,0.25W	01121	CB3035
A60R77	315-0474-00			RES.,FXD,CMPSN:470K OHM,5%,0.25W	01121	CB4745
A60R83	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
A60R84	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A60R85	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A60R86	315-0241-00			RES.,FXD,CMPSN:240 OHM,5%,0.25W	01121	CB2415
A60R87	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
A60R88	315-0331-00			RES.,FXD,CMPSN:330 OHM,5%,0.25W	01121	CB3315
A60R89	315-0331-00			RES.,FXD,CMPSN:330 OHM,5%,0.25W	01121	CB3315
A60R99	301-0201-00	B000100	B000119	RES.,FXD,CMPSN:200 OHM,5%,0.5W	01121	EB2015
A60S01	263-0011-09			SWITCH PB ASSY:1 PUSH,10MM,3 CONTACTS	80009	263-0011-09
A60S03	263-0011-09			SWITCH PB ASSY:1 PUSH,10MM,3 CONTACTS	80009	263-0011-09
A60S06	263-0023-02			SWITCH,PB ASSY:3 LCH,7.5MM,6 CONTACTS	80009	263-0023-02
A60U12	156-0200-00	B000100	B010647	MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	04713	MC1456P1
A60U12	156-0200-02	B010648		MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	04713	MC1456U
A60U17	156-0158-05	B000100	B010227	MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER	80009	156-0158-05
A60U17	156-0158-04	B010228		MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER	01295	N99320JG
A60U18	156-0356-00	B000100	B010647	MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0356-00
A60U18	156-0356-01	B010648		MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	02735	CA3080TX
A60U24	155-0144-00			MICROCIRCUIT,LI:DUAL IN-LINE,16 LEAD	80009	155-0144-00
A60U31	156-0382-02			MICROCIRCUIT,DI:QUAD 2-INP NAND GATE	01295	SN74LS00
A60U33	156-0385-02			MICROCIRCUIT,DI:HEX INVERTER	01295	SN74LS04
A60U34	156-0091-00	B000100	B010652	MICROCIRCUIT,DI:DIV BY 2 AND 5 RIPPLE CNTR	80009	156-0091-00
A60U34	156-0727-01	B010653		MICROCIRCUIT,DI:30MHZ,PRESETTABLE DECADE	80009	156-0727-01
A60U41	156-0081-02			MICROCIRCUIT,DI:RETRIG MONOSTABLE MV,SCRN	80009	156-0081-02
A60U43	156-0388-03			MICROCIRCUIT,DI:DUAL D FLIP-FLOP	07263	74LS74A
A60U45	156-0158-05	B000100	B010227	MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER	80009	156-0158-05
A60U45	156-0158-04	B010228		MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER	01295	N99320JG
A60U48	156-0570-00			MICROCIRCUIT,LI:DUAL HIGH SPEED COMPARATOR	27014	LM319H
A60U53	156-0388-03			MICROCIRCUIT,DI:DUAL D FLIP-FLOP	07263	74LS74A
A60U61	156-0561-00			MICROCIRCUIT,DI:	01295	SN7493J
A60U62	156-0733-02			MICROCIRCUIT,DI:DUAL MONOSTABLE MV,SCRN	01295	SN74LS221N3
A60U64	156-0721-02			MICROCIRCUIT,DI:QUAD 2-IN NAND SCHMITT TRI	04713	SN74LS132NDS
A60U65	156-0651-02			MICROCIRCUIT,DI:8 BIT PRL-OUT SER SHF RGTR	01295	SN74LS164(NP3 OR
A60U66	156-0388-03			MICROCIRCUIT,DI:DUAL D FLIP-FLOP	07263	74LS74A
A60U71	156-0479-02			MICROCIRCUIT,DI:QUAD 2-INP OR GATE	01295	SN74LS32NP3
A60U73	156-0479-02			MICROCIRCUIT,DI:QUAD 2-INP OR GATE	01295	SN74LS32NP3
A60U74	156-0905-11			MICROCIRCUIT,DI:256 X 4 PROM,PROGRAMMED	80009	156-0905-11
A60U76	156-0422-02			MICROCIRCUIT,DI:UP/DOWN SYN BINARY CNTR	01295	SN74LS191
A60U78	156-0385-02	B000100	B000119	MICROCIRCUIT,DI:HEX INVERTER	01295	SN74LS04
A60U78	156-0058-02	B010120		MICROCIRCUIT,DI:HEX INVRTR,SCREENED	01295	SN7404
A60U79	156-0030-03			MICROCIRCUIT,DI:QUAD 2-INP NAND GATE,SCRN	01295	SN7400(NP3 OR JP
A60U81	156-0381-02			MICROCIRCUIT,DI:QUAD 2-INP EXCL OR GATE	01295	SN74LS86
A60U83	156-0381-02			MICROCIRCUIT,DI:QUAD 2-INP EXCL OR GATE	01295	SN74LS86
A60U84	156-0480-02			MICROCIRCUIT,DI:QUAD 2 INP & GATE	01295	SN74LS08NP3

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A60U86	156-0422-02			MICROCIRCUIT,DI:UP/DOWN SYN BINARY CNTR	01295	SN74LS191
A60U91	156-0480-02			MICROCIRCUIT,DI:QUAD 2 INP & GATE	01295	SN74LS08NP3
A60U93	156-0480-02			MICROCIRCUIT,DI:QUAD 2 INP & GATE	01295	SN74LS08NP3
A60U94	156-0905-12			MICROCIRCUIT,DI:256 X 4 PROM,PROGRAMMED	80009	156-0905-12

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A61	670-5023-00	B010100	B010997	CKT BOARD ASSY:READOUT DRIVER	80009	670-5023-00
A61	670-5023-01	B010998		CKT BOARD ASSY:READOUT DRIVER	80009	670-5023-01
A61C39	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A61C64	283-0067-00			CAP.,FXD,CER DI:0.001UF,10%,200V	59660	835-515-Z5D0102K
A61C72	283-0032-00			CAP.,FXD,CER DI:470PF,5%,500V	59660	0831085Z5E00471J
A61C84	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A61C91	283-0111-00	B000100	B010144	CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A61C91	283-0339-00	B010145		CAP.,FXD,CER DI:0.22UF.10%,50V	72982	8131N075W5R224K
A61C92	283-0594-00			CAP.,FXD,MICA D:0.001UF,1%,100V	00853	D151F102F0
A61C93	283-0601-00			CAP.,FXD,MICA D:22PF,10%,300V	00853	D155E220K0
A61C94	281-0204-00			CAP.,VAR,PLSTC:2-22PF,100V	80031	287C00222MJ02
A61C95	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	96733	R2632
A61C96	290-0782-00			CAP.,FXD,ELCTLT:4.7UF,+75-10%,35V	55680	ULA1V4R7TEA
A61C97	283-0330-00	B010998		CAP.,FXD,CER DI:100PF,5%,50V	51642	200-050-NP0-101J
A61C99	290-0782-00			CAP.,FXD,ELCTLT:4.7UF,+75-10%,35V	55680	ULA1V4R7TEA
A61CR82	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A61CR91	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A61CR92	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A61CR96	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A61Q50	151-0301-00			TRANSISTOR:SILICON,PNP	27014	2N2907A
A61Q73	151-0302-00			TRANSISTOR:SILICON,NPN	07263	S038487
A61Q83	151-0127-00			TRANSISTOR:SILICON,NPN	07263	S006075
A61Q92	151-0127-00			TRANSISTOR:SILICON,NPN	07263	S006075
A61Q95	151-0301-00			TRANSISTOR:SILICON,PNP	27014	2N2907A
A61Q96	151-0261-00			TRANSISTOR:SILICON,PNP,DUAL	04713	SD441
A61R10	315-0301-00			RES.,FXD,CMPSN:300 OHM,5%,0.25W	01121	CB3015
A61R11	315-0301-00			RES.,FXD,CMPSN:300 OHM,5%,0.25W	01121	CB3015
A61R12	315-0301-00			RES.,FXD,CMPSN:300 OHM,5%,0.25W	01121	CB3015
A61R13	315-0301-00			RES.,FXD,CMPSN:300 OHM,5%,0.25W	01121	CB3015
A61R14	315-0301-00			RES.,FXD,CMPSN:300 OHM,5%,0.25W	01121	CB3015
A61R15	315-0301-00			RES.,FXD,CMPSN:300 OHM,5%,0.25W	01121	CB3015
A61R16	315-0301-00			RES.,FXD,CMPSN:300 OHM,5%,0.25W	01121	CB3015
A61R17	315-0301-00			RES.,FXD,CMPSN:300 OHM,5%,0.25W	01121	CB3015
A61R18	315-0301-00			RES.,FXD,CMPSN:300 OHM,5%,0.25W	01121	CB3015
A61R19	315-0301-00			RES.,FXD,CMPSN:300 OHM,5%,0.25W	01121	CB3015
A61R20	315-0301-00			RES.,FXD,CMPSN:300 OHM,5%,0.25W	01121	CB3015
A61R21	315-0301-00			RES.,FXD,CMPSN:300 OHM,5%,0.25W	01121	CB3015
A61R22	315-0301-00			RES.,FXD,CMPSN:300 OHM,5%,0.25W	01121	CB3015
A61R23	315-0301-00			RES.,FXD,CMPSN:300 OHM,5%,0.25W	01121	CB3015
A61R24	315-0301-00			RES.,FXD,CMPSN:300 OHM,5%,0.25W	01121	CB3015
A61R25	315-0301-00			RES.,FXD,CMPSN:300 OHM,5%,0.25W	01121	CB3015
A61R26	315-0301-00			RES.,FXD,CMPSN:300 OHM,5%,0.25W	01121	CB3015
A61R27	315-0301-00			RES.,FXD,CMPSN:300 OHM,5%,0.25W	01121	CB3015
A61R28	315-0301-00			RES.,FXD,CMPSN:300 OHM,5%,0.25W	01121	CB3015
A61R29	315-0301-00			RES.,FXD,CMPSN:300 OHM,5%,0.25W	01121	CB3015
A61R30	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A61R31	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A61R35	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A61R36	315-0301-00			RES.,FXD,CMPSN:300 OHM,5%,0.25W	01121	CB3015
A61R37	315-0301-00			RES.,FXD,CMPSN:300 OHM,5%,0.25W	01121	CB3015
A61R38	315-0301-00			RES.,FXD,CMPSN:300 OHM,5%,0.25W	01121	CB3015
A61R39	315-0301-00			RES.,FXD,CMPSN:300 OHM,5%,0.25W	01121	CB3015
A61R50	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A61R51	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035

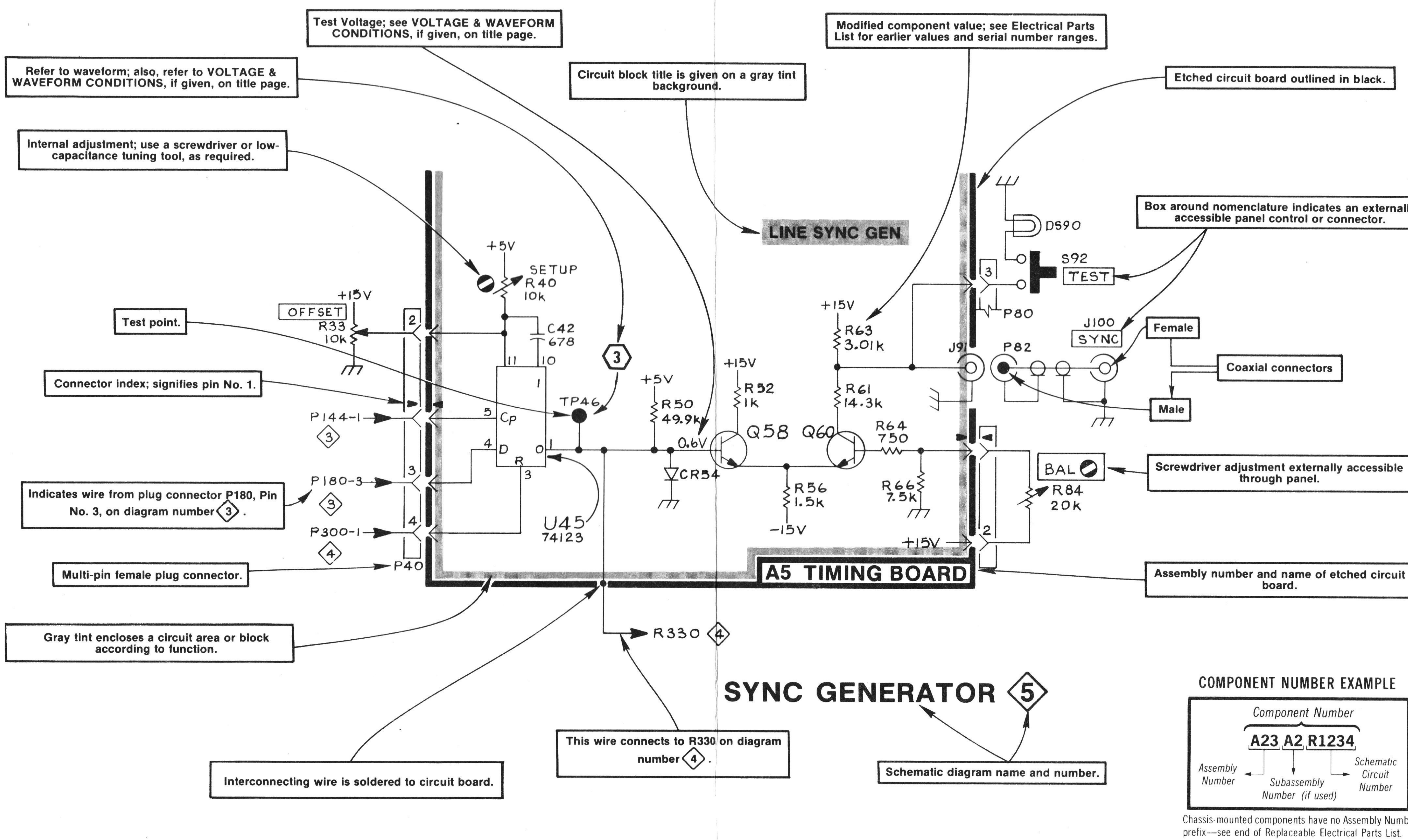
Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A61R52	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A61R53	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A61R54	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A61R55	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A61R56	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A61R57	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A61R58	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A61R59	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A61R60	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
A61R61	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
A61R62	315-0301-00			RES.,FXD,CMPSN:300 OHM,5%,0.25W	01121	CB3015
A61R64	315-0301-00			RES.,FXD,CMPSN:300 OHM,5%,0.25W	01121	CB3015
A61R68	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A61R69	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A61R72	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A61R73	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A61R74	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A61R81	315-0304-00			RES.,FXD,CMPSN:300K OHM,5%,0.25W	01121	CB3045
A61R82	315-0335-00	B000100	B010157	RES.,FXD,CMPSN:3.3M OHM,5%,0.25W	01121	CB3355
A61R82	315-0155-00	B010158		RES.,FXD,CMPSN:1.5M OHM,5%,0.25W	01121	CB1555
A61R83	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A61R84	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A61R91	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A61R95	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A61R96	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A61R97	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A61S56	260-1589-00			SWITCH,PUSH:(6)SPST,0.1A,5V	00779	435166-4
A61S57	260-1589-00			SWITCH,PUSH:(6)SPST,0.1A,5V	00779	435166-4
A61U32	156-0128-01			MICROCIRCUIT,DI:BCD-TO 7 SEG DCDR/DRVR	80009	156-0128-01
A61U35	156-0128-01			MICROCIRCUIT,DI:BCD-TO 7 SEG DCDR/DRVR	80009	156-0128-01
A61U38	156-0128-01			MICROCIRCUIT,DI:BCD-TO 7 SEG DCDR/DRVR	80009	156-0128-01
A61U41	156-0087-00			MICROCIRCUIT,DI:4-BIT BINARY FULL ADDER	80009	156-0087-00
A61U43	156-0569-00			MICROCIRCUIT,DI:BCD COUNTER	27014	DM74LS190
A61U46	156-0569-00			MICROCIRCUIT,DI:BCD COUNTER	27014	DM74LS190
A61U48	156-0569-00			MICROCIRCUIT,DI:BCD COUNTER	27014	DM74LS190
A61U60	156-0382-02			MICROCIRCUIT,DI:QUAD 2-INP NAND GATE	01295	SN74LS00
A61U63	156-0388-03			MICROCIRCUIT,DI:DUAL D FLIP-FLOP	07263	74LS74A
A61U65	156-0386-02			MICROCIRCUIT,DI:TRIPLE 3-INP NAND GATE	27014	DM74LS10N
A61U68	156-0480-02			MICROCIRCUIT,DI:QUAD 2 INP & GATE	01295	SN74LS08NP3
A61U81	156-0656-02			MICROCIRCUIT,DI:DECADE COUNTER,BURN-IN	01295	SN74LS90
A61U85	156-0382-02			MICROCIRCUIT,DI:QUAD 2-INP NAND GATE	01295	SN74LS00
A61U88	156-0422-02			MICROCIRCUIT,DI:UP/DOWN SYN BINARY CNTR	01295	SN74LS191
A61U91	156-0402-00	B000100	B010647	MICROCIRCUIT,LI:TIMER	27014	LM555CN
A61U91	156-0402-01	B010648		MICROCIRCUIT,LI:TIMER,CHK	80009	156-0402-01
A61U94	156-0096-00			MICROCIRCUIT,LI:VOLTAGE COMPARATOR	27014	LM311H
A61U98	156-0422-02			MICROCIRCUIT,DI:UP/DOWN SYN BINARY CNTR	01295	SN74LS191

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A62	670-5024-00			CKT BOARD ASSY:READOUT	80009	670-5024-00
A62DS24	150-1038-00			LAMP,LED RDOUT:ORANGE 7SEG,POLARITY IND	58361	03410/MAN3630A
A62DS34	150-1037-00			LAMP,LED,RDOUT:7 SEGMENT,LH DECIMAL,ORANGE	58361	03409/MAN36202
A62DS44	150-1037-00			LAMP,LED,RDOUT:7 SEGMENT,LH DECIMAL,ORANGE	58361	03409/MAN36202
A62DS64	150-1037-00			LAMP,LED,RDOUT:7 SEGMENT,LH DECIMAL,ORANGE	58361	03409/MAN36202
A62DS73	150-1000-00			LT EMITTING DIO:RED,650NM,40MA MAX	34430	MV-50
A62DS75	150-1000-00			LT EMITTING DIO:RED,650NM,40MA MAX	34430	MV-50

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A70	670-4987-00			CKT BOARD ASSY:POWER SUPPLY	80009	670-4987-00
A70C01	290-0770-00			CAP.,FXD,ELCTLT:100UF,+50-10%,25V	56289	502D230
A70C04	283-0177-00			CAP.,FXD,CER DI:1UF,+80-20%,25V	04222	SR302E105ZAA
A70C12	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
A70C13	283-0060-00			CAP.,FXD,CER DI:100PF,5%,200V	59660	855-535U2J101J
A70C14	283-0067-00			CAP.,FXD,CER DI:0.001UF,10%,200V	59660	835-515-Z5D0102K
A70C21	290-0517-00			CAP.,FXD,ELCTLT:6.8UF,20%,35V	56289	196D685X0035KA1
A70C31	290-0770-00			CAP.,FXD,ELCTLT:100UF,+50-10%,25V	56289	502D230
A70C33	283-0177-00			CAP.,FXD,CER DI:1UF,+80-20%,25V	04222	SR302E105ZAA
A70C37	290-0436-00			CAP.,FXD,ELCTLT:10,000UF,20%,10V	56289	68D10467
A70C42	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
A70C44	283-0060-00			CAP.,FXD,CER DI:100PF,5%,200V	59660	855-535U2J101J
A70C51	290-0517-00			CAP.,FXD,ELCTLT:6.8UF,20%,35V	56289	196D685X0035KA1
A70C54	283-0067-00			CAP.,FXD,CER DI:0.001UF,10%,200V	59660	835-515-Z5D0102K
A70C57	290-0506-00			CAP.,FXD,ELCTLT:9600UF,+100-10%,25V	56289	68D10471
A70C62	290-0517-00			CAP.,FXD,ELCTLT:6.8UF,20%,35V	56289	196D685X0035KA1
A70C71	290-0517-00			CAP.,FXD,ELCTLT:6.8UF,20%,35V	56289	196D685X0035KA1
A70C84	283-0067-00			CAP.,FXD,CER DI:0.001UF,10%,200V	59660	835-515-Z5D0102K
A70C85	283-0060-00			CAP.,FXD,CER DI:100PF,5%,200V	59660	855-535U2J101J
A70C87	290-0506-00			CAP.,FXD,ELCTLT:9600UF,+100-10%,25V	56289	68D10471
A70C91	290-0770-00			CAP.,FXD,ELCTLT:100UF,+50-10%,25V	56289	502D230
A70C92	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
A70C93	283-0177-00			CAP.,FXD,CER DI:1UF,+80-20%,25V	04222	SR302E105ZAA
A70CR20	152-0066-00			SEMICOND DEVICE:SILICON,400V,750MA	14433	LG4016
A70CR25	152-0198-00			SEMICOND DEVICE:SILICON,200V,3A	03508	1N5624
A70CR31	152-0066-00			SEMICOND DEVICE:SILICON,400V,750MA	14433	LG4016
A70CR35	152-0198-00			SEMICOND DEVICE:SILICON,200V,3A	03508	1N5624
A70CR36	152-0198-00			SEMICOND DEVICE:SILICON,200V,3A	03508	1N5624
A70CR45	152-0198-00			SEMICOND DEVICE:SILICON,200V,3A	03508	1N5624
A70CR55	152-0659-00			SEMICOND DEVICE:SILICON,100V,6A	04713	MR751
A70CR65	152-0659-00			SEMICOND DEVICE:SILICON,100V,6A	04713	MR751
A70CR75	152-0659-00			SEMICOND DEVICE:SILICON,100V,6A	04713	MR751
A70CR76	152-0659-00			SEMICOND DEVICE:SILICON,100V,6A	04713	MR751
A70CR81	152-0066-00			SEMICOND DEVICE:SILICON,400V,750MA	14433	LG4016
A70DS10	150-1001-00			LT EMITTING DIO:RED,66ONM,100MA MAX	50522	MV5024
A70DS40	150-1001-00			LT EMITTING DIO:RED,66ONM,100MA MAX	50522	MV5024
A70DS70	150-1001-00			LT EMITTING DIO:RED,66ONM,100MA MAX	50522	MV5024
A70F17	159-0014-00			FUSE,CARTRIDGE:3AG,5A,250V,FAST-BLOW	71400	MTH5
A70Q10	151-0192-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS652	04713	SPS8801
A70Q13	151-0389-00			TRANSISTOR:SILICON,PNP	80009	151-0389-00
A70Q14	151-0220-00			TRANSISTOR:SILICON,PNP	07263	S036228
A70Q22	151-0232-00			TRANSISTOR:SILICON,NPN,DUAL	07263	SP12141
A70Q23	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
A70Q41	151-0192-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS652	04713	SPS8801
A70Q43	151-0389-00			TRANSISTOR:SILICON,PNP	80009	151-0389-00
A70Q52	151-0232-00			TRANSISTOR:SILICON,NPN,DUAL	07263	SP12141
A70Q53	151-0220-00			TRANSISTOR:SILICON,PNP	07263	S036228
A70Q54	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
A70Q72	151-0220-00			TRANSISTOR:SILICON,PNP	07263	S036228
A70Q73	151-0220-00			TRANSISTOR:SILICON,PNP	07263	S036228
A70Q81	151-0220-00			TRANSISTOR:SILICON,PNP	07263	S036228
A70Q82	151-0192-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS652	04713	SPS8801
A70Q83	151-0207-00			TRANSISTOR:SILICON,NPN	03508	X32D6191
A70R02	308-0590-00			RES.,FXD,WW:0.25 OHM,5%,3W	91637	RS2BER2500J

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A70R06	315-0471-00	B010120		RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
A70R10	315-0122-00			RES.,FXD,CMPSN:1.2K OHM,5%,0.25W	01121	CB1225
A70R11	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A70R12	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A70R13	315-0680-00			RES.,FXD,CMPSN:68 OHM,5%,0.25W	01121	CB6805
A70R14	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
A70R15	315-0241-00			RES.,FXD,CMPSN:240 OHM,5%,0.25W	01121	CB2415
A70R16	315-0471-00	B000100	B000119	RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
A70R20	321-0779-03			RES.,FXD,FILM:7.020K OHM,0.25%,0.125W	91637	MFF1816D70200C
A70R21	321-0779-03			RES.,FXD,FILM:7.020K OHM,0.25%,0.125W	91637	MFF1816D70200C
A70R22	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
A70R23	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A70R24	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
A70R25	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
A70R32	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A70R33	315-0680-00			RES.,FXD,CMPSN:68 OHM,5%,0.25W	01121	CB6805
A70R41	308-0590-00			RES.,FXD,WW:0.25 OHM,5%,3W	91637	RS2BER2500J
A70R42	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A70R44	315-0241-00			RES.,FXD,CMPSN:240 OHM,5%,0.25W	01121	CB2415
A70R45	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
A70R50	315-0331-00			RES.,FXD,CMPSN:330 OHM,5%,0.25W	01121	CB3315
A70R51	321-0816-03			RES.,FXD,FILM:5K OHM,0.25%,0.125W	91637	MFF1816D50000C
A70R52	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A70R53	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A70R54	315-0684-00			RES.,FXD,CMPSN:680K OHM,5%,0.25W	01121	CB6845
A70R55	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
A70R56	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
A70R60	321-0603-00			RES.,FXD,FILM:15K OHM,0.25%,0.125W	91637	MFF1816D15001C
A70R61	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
A70R62	315-0362-00			RES.,FXD,CMPSN:3.6K OHM,5%,0.25W	01121	CB3625
A70R63	315-0363-00			RES.,FXD,CMPSN:36K OHM,5%,0.25W	01121	CB3635
A70R64	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
A70R65	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A70R66	311-1241-00			RES.,VAR,NONWIR:100K OHM,10%,0.5W	32997	3386X-T07-104
A70R70	321-0200-00			RES.,FXD,FILM:1.18K OHM,1%,0.125W	91637	MFF1816G11800F
A70R71	321-0669-00			RES.,FXD,FILM:6.08K OHM,0.5%,0.125W	91637	MFF1816D60800D
A70R72	321-0283-08			RES.,FXD,FILM:8.66K OHM,1%,0.125W	24546	NC55C8660F
A70R73	315-0105-00			RES.,FXD,CMPSN:1M OHM,5%,0.25W	01121	CB1055
A70R74	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
A70R75	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
A70R80	315-0122-00			RES.,FXD,CMPSN:1.2K OHM,5%,0.25W	01121	CB1225
A70R82	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A70R83	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A70R84	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A70R85	315-0680-00			RES.,FXD,CMPSN:68 OHM,5%,0.25W	01121	CB6805
A70R86	315-0241-00			RES.,FXD,CMPSN:240 OHM,5%,0.25W	01121	CB2415
A70R91	308-0590-00			RES.,FXD,WW:0.25 OHM,5%,3W	91637	RS2BER2500J
A70R93	301-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.50W	01121	EB1025
A70R94	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
A70VR62	152-0317-00			SEMICOND DEVICE:ZENER,0.25W,6.2V,5%	04713	SZG20012
A70VR73	152-0127-00			SEMICOND DEVICE:ZENER,0.4W,7.5V,5%	04713	SZG35009K2

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
				CHASSIS PARTS		
C1	283-0672-00			CAP.,FXD,MICA D:200PF,1%,500V	00853	D155F2010F0
C2	285-0862-00			CAP.,FXD,PLSTC:0.001,10%,100V	56289	192P10292
C3	285-0598-00			CAP.,FXD,PLSTC:0.01UF,5%,100V	19396	DU490B103J
C4	285-1101-00			CAP.,FXD,PLSTC:0.022UF,10%,20OV	19396	223K02PT485
C5	283-0179-00			CAP.,FXD,CER DI:0.68UF,10%,100V	56289	3C37X5R684K100B
C12	283-0065-00			CAP.,FXD,CER DI:0.001UF,5%,100V	59660	0835-591Y5EO102J
DS1	150-1017-00			LT EMITTING DIO:GREEN,550NM,55MA MAX	50437	LSM-16L-100
DS2	150-1036-00			LAMP,LED:RED,3.0V,40MA	01295	TIL 209A
DS2	----- -----			(1450 ONLY)		
DS2	150-1036-00	B010380	B010439	LAMP,LED:RED,3.0V,40MA	01295	TIL 209A
DS2	150-1077-00	B010440		LT EMITING DIO:RED,650NM,40MA MAX	50579	COV 10-3
DS2	----- -----			(1450-1 ONLY)		
DS3	150-1036-00			LAMP,LED:RED,3.0V,40MA	01295	TIL 209A
DS3	----- -----			(1450 ONLY)		
DS3	150-1036-00	B010380	B010439	LAMP,LED:RED,3.0V,40MA	01295	TIL 209A
DS3	150-1077-00	B010440		LT EMITING DIO:RED,650NM,40MA MAX	50579	COV 10-3
DS3	----- -----			(1450-1 ONLY)		
DS4	150-1036-00			LAMP,LED:RED,3.0V,40MA	01295	TIL 209A
DS4	----- -----			(1450 ONLY)		
DS4	150-1036-00	B010380	B010439	LAMP,LED:RED,3.0V,40MA	01295	TIL 209A
DS4	150-1077-00	B010440		LT EMITING DIO:RED,650NM,40MA MAX	50579	COV 10-3
DS4	----- -----			(1450-1 ONLY)		
F10	159-0041-00			FUSE,CARTRIDGE:3AG,1.25A,250V,SLOW-BLOW	71400	MDX 1 25/100
J1	131-1315-01			CONN,RCPT,ELEC:BNC,FEMALE	24931	28JR 306-1
J3	131-2007-00	B000100	B010435	CONN,PLUG,ELEC:LATCH LOCKING,3 MALE CONT	80009	131-2007-00
J3	131-0267-00	B010436		JACK,TELEPHONE:3 CONDUCTOR	82389	12B
J4	131-0934-00			CONN,RCPT,ELEC:CKT BD,12/24 CONT	31781	307-024-500-302
J10	131-1315-01			CONN,RCPT,ELEC:BNC,FEMALE	24931	28JR 306-1
J11	131-1315-01			CONN,RCPT,ELEC:BNC,FEMALE	24931	28JR 306-1
J12	124-0342-00			TERMINAL BOARD:2 CONTACTS	12089	72202-E
J13	131-2007-00	B000100	B010435	CONN,PLUG,ELEC:LATCH LOCKING,3 MALE CONT	80009	131-2007-00
J13	131-0014-00	B010436		CONN,RCPT,ELEC:MALE,3 CONTACT	82389	C3M
J14	131-1006-00			CONN,RCPT,ELEC:9 CONTACT,FEMALE	71468	DE 9S
J16	131-1315-01			CONN,RCPT,ELEC:BNC,FEMALE	24931	28JR 306-1
J17	131-1315-01			CONN,RCPT,ELEC:BNC,FEMALE	24931	28JR 306-1
J18	131-1315-01			CONN,RCPT,ELEC:BNC,FEMALE	24931	28JR 306-1
J19	131-1315-01			CONN,RCPT,ELEC:BNC,FEMALE	24931	28JR 306-1
J20	131-1315-01			CONN,RCPT,ELEC:BNC,FEMALE	24931	28JR 306-1
LR12	108-0554-00	B000100	B010187	COIL,RF:5UH	80009	108-0554-00
LR12	108-0931-00	B010188		COIL,RF:FIXED,400NH	80009	108-0931-00
P10	119-0813-00			SELECTOR,VOLTS:W/LINE FLTR RCPT & FUSE	02777	F65003
Q05	151-0373-00			TRANSISTOR:SILICON,PNP	80009	151-0373-00
Q34	151-0373-00			TRANSISTOR:SILICON,PNP	80009	151-0373-00
Q95	151-0349-00			TRANSISTOR:SILICON,NPN,SEL FROM MJE280	04713	SJE924
R1	311-1483-00			RES.,VAR,NONWIR:100K OHM,20%,1W	01121	73J1GO40L104M
R2	311-1150-00			RES.,VAR,WW:10K OHM,5%	73138	7381-1-0
R3	311-0555-00			RES.,VAR,NONWIR:10K OHM,20%,0.50W	01121	10M985
R12	315-0101-00	B000100	B010187	RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
S1	260-1874-00			SWITCH,ROTARY:TIME CONSTANT	80009	260-1874-00
S2	260-1901-00			SWITCH,TOGGLE:DPST,8A,250V	15605	7320K55 29-761
T10	120-1145-00			XFMR,PWR,STPDN:	80009	120-1145-00
W2	175-2079-00			CABLE ASSY,RF:50 OHM COAX,16.0 L	80009	175-2079-00
W3	012-0751-00			CABLE,INTERCON:7.375 L	80009	012-0751-00
W4	012-0752-00			CABLE,INTERCON:7.5 L	80009	012-0752-00
W15	175-2078-00			CABLE ASSY,RF:50 OHM COAX,6.0 L	80009	175-2078-00



SCHEMATIC EXAMPLE

2597-37

DIAGRAMS & CIRCUIT BOARD ILLUSTRATIONS

This section of the manual contains block and schematic diagrams with waveforms, and etched circuit board illustrations.

Symbols

Symbols used on the diagrams are based on ANSI Y32.2-1970 and IEEE No. 315 March 1971. Logic symbology is based on ANSI Y32.14-1973 (IEEE Std. 91-1973). Logic symbols depict the logic function performed and may differ from the manufacturer's data.

Component Values

Electrical components shown on the diagrams are in the following units unless noted otherwise:

Capacitors = Values one or greater are in picofarads (pF).
Values less than one are in micofarads (μF).

Resistors = Ohms (Ω).

Semiconductor Types

Refer to the Electrical Parts List.

Reference Designators

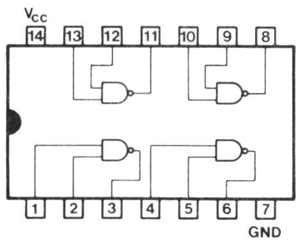
The following letters are used as reference designators to identify components or assemblies on Tektronix, Inc. schematic diagrams.

- **A** Assembly, separable or repairable (circuit board, etc.)
- **AT** Attenuator, fixed or variable
- **B** Motor
- **BT** Battery
- **C** Capacitor, fixed or variable
- **CR** Diode, signal or rectifier
- **DH** Decoupling Hybrid
- **DL** Delay Line
- **DS** Indicating device (lamp)
- **E** Spark Gap
- **F** Fuse
- **FL** Filter
- **H** Heat dissipating device (heat sink, heat radiator, etc.)
- **HR** Heater
- **J** Connector, stationary portion
- **K** Relay
- **L** Inductor, fixed or variable
- **LR** Inductor/resistor combination
- **M** Meter
- **P** Connector, movable portion
- **Q** Transistor, silicon-controlled rectifier, or programmable unijunction transistor
- **R** Resistor, fixed or variable
- **RT** Thermistors
- **S** Switch
- **T** Transformer
- **TC** Thermocouple
- **TP** Test Point
- **U** Assembly, inseparable or non-repairable (integrated circuit, etc.)
- **V** Electron tube
- **VR** Voltage regulator (zener diode, etc.)
- **Y** Crystal

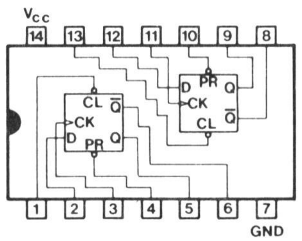
Partial Schematic Diagram With Explanations

The partial diagram at the left is an example of the various symbols and other information provided on Tektronix, Inc. diagrams.

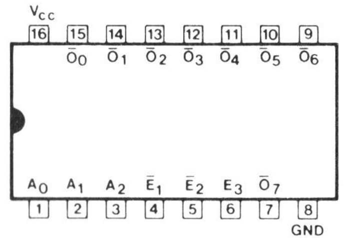
IC LOGIC DIAGRAMS



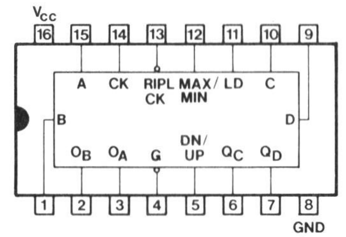
7400, 74LS00



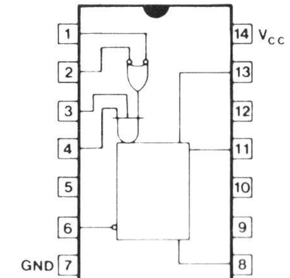
74LS74



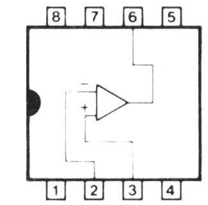
74LS138



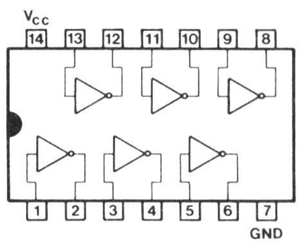
74LS191



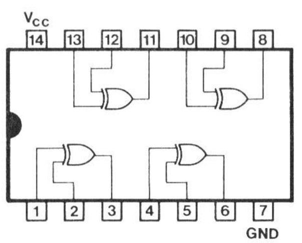
9601



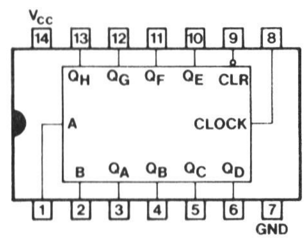
741



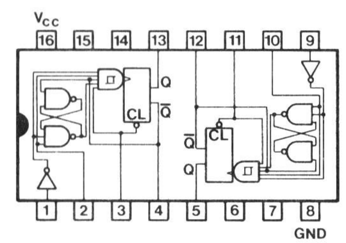
7404, 74LS04



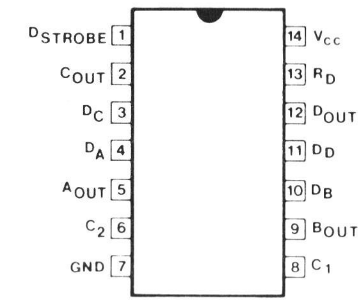
74LS86



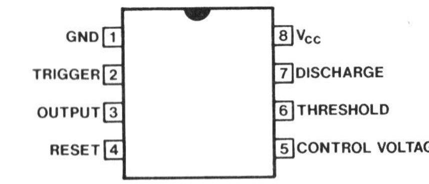
74LS164



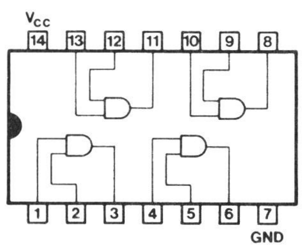
74LS221



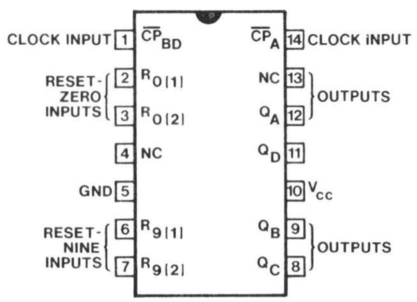
8292



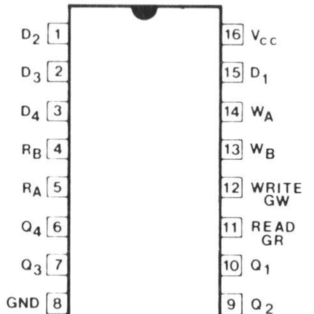
555



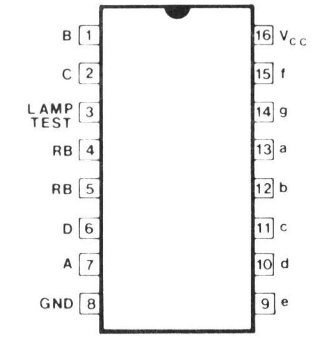
74LS08



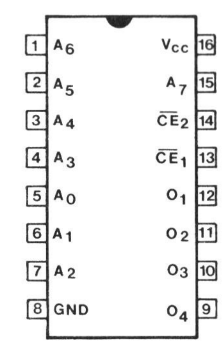
74LS90



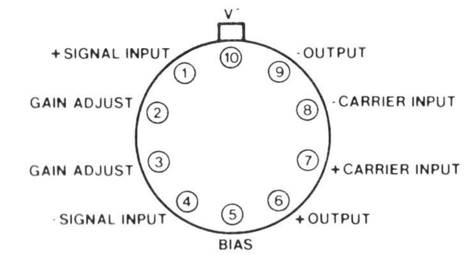
74LS170



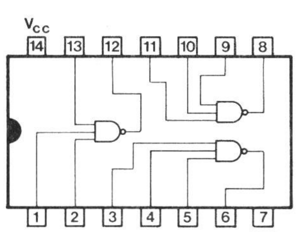
7447



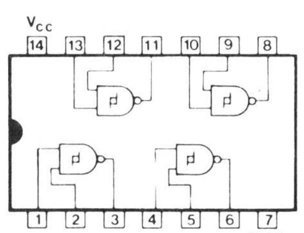
93427



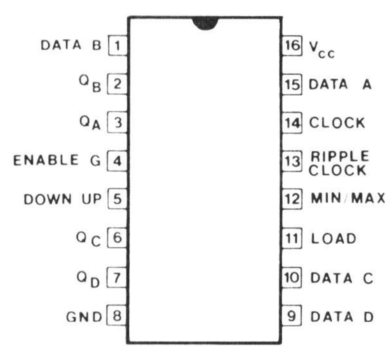
1496



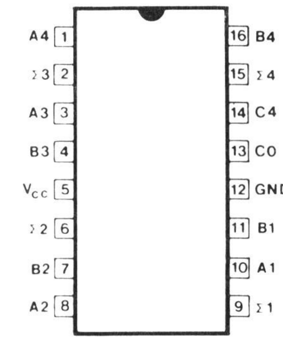
74LS10



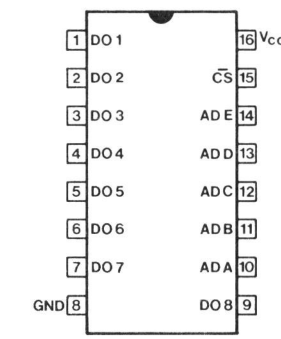
74LS132



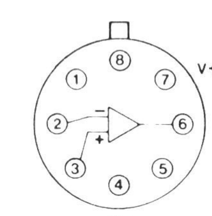
74LS190



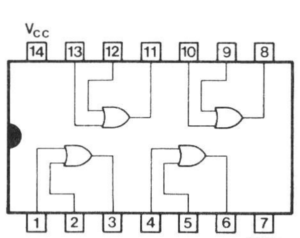
7483



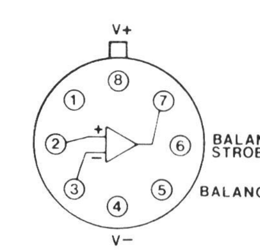
74288



3080

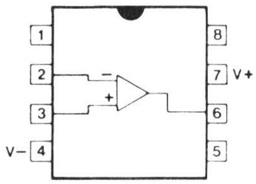


74LS32

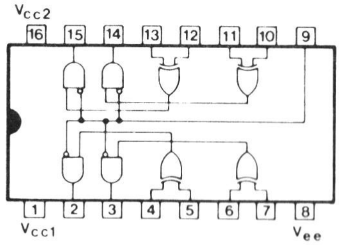


311

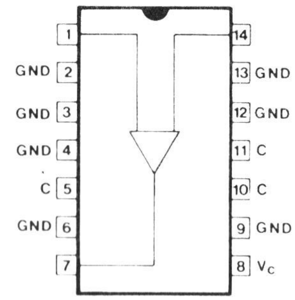
REV MAY 1982



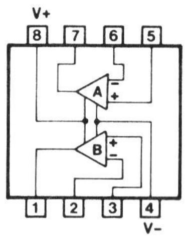
1456



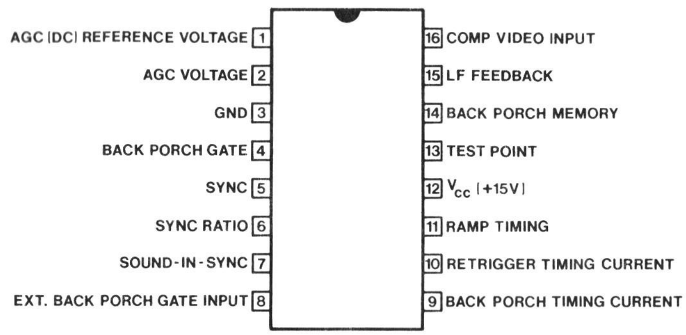
10113



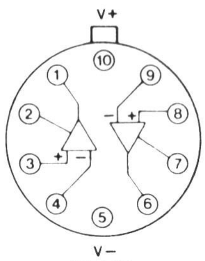
1355



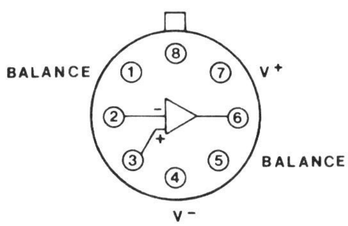
1458



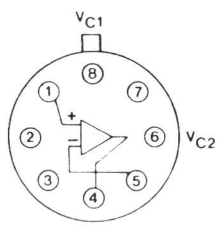
155-0144-00



319



356



3028

WAVEFORM CONDITIONS

1450-1

SYNCHRONOUS DETECTION MODE	BACK PORCH
SOUND TRAP	IN
INTERNAL ZERO CARRIER REF	ON
AUTO AGC	BACK PORCH
AUDIO SOURCE	INTR
DE-EMPHASIS	IN

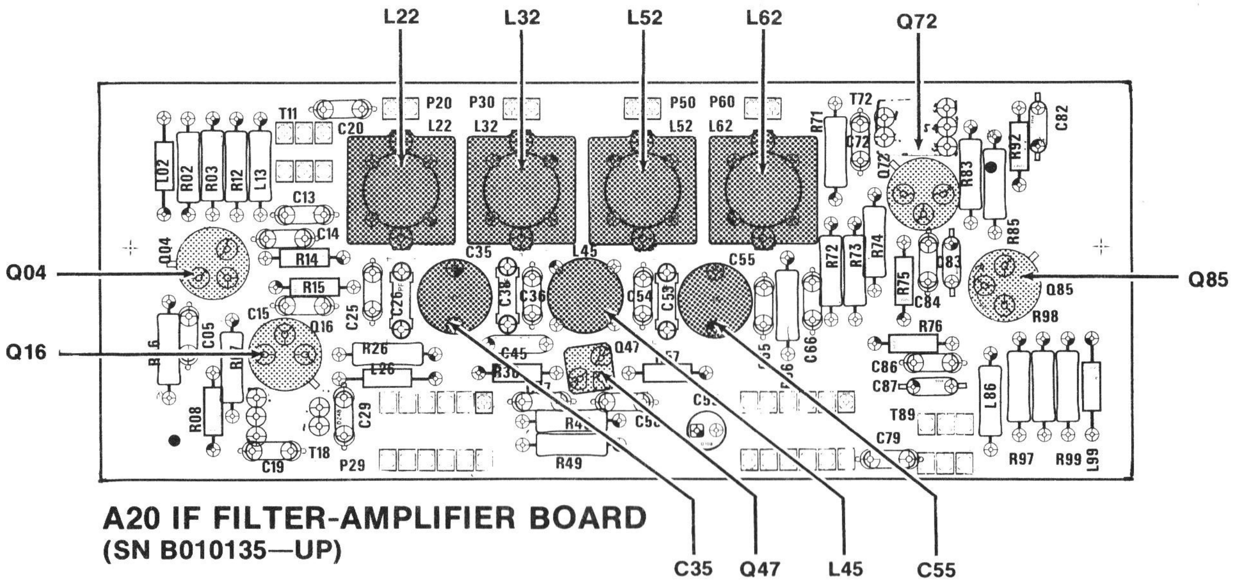
TEST MODULATOR

THE 1450-1 IF INPUT DRIVEN WITH A TEST MODULATOR
THE TEST MODULATOR DRIVEN WITH:

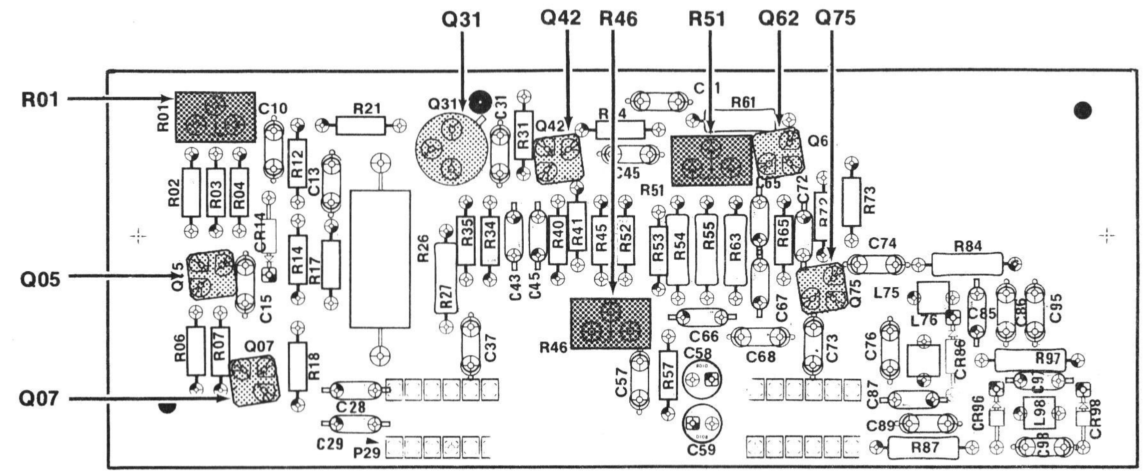
1. LINEARITY RAMP (VIDEO)
2. 10 kHz (AUDIO)
3. NO PRE-EMPHASIS

Diagram ⟨9⟩ waveforms ⟨1⟩ ⟨2⟩ ⟨3⟩ & ⟨4⟩ taken with pins 5 and 6 on A53 shorted together.

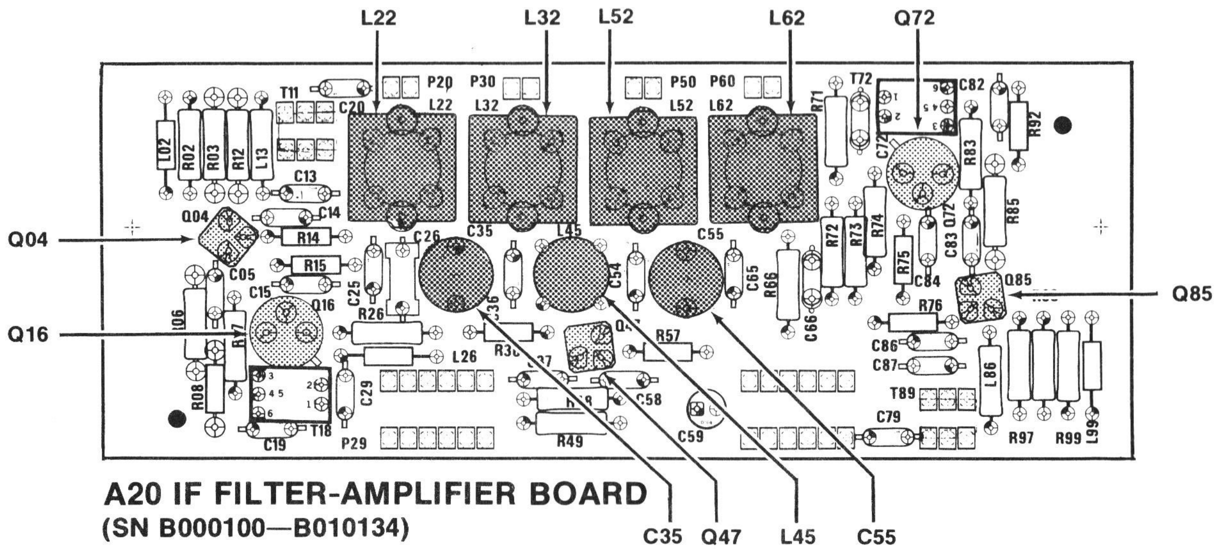
2200-118



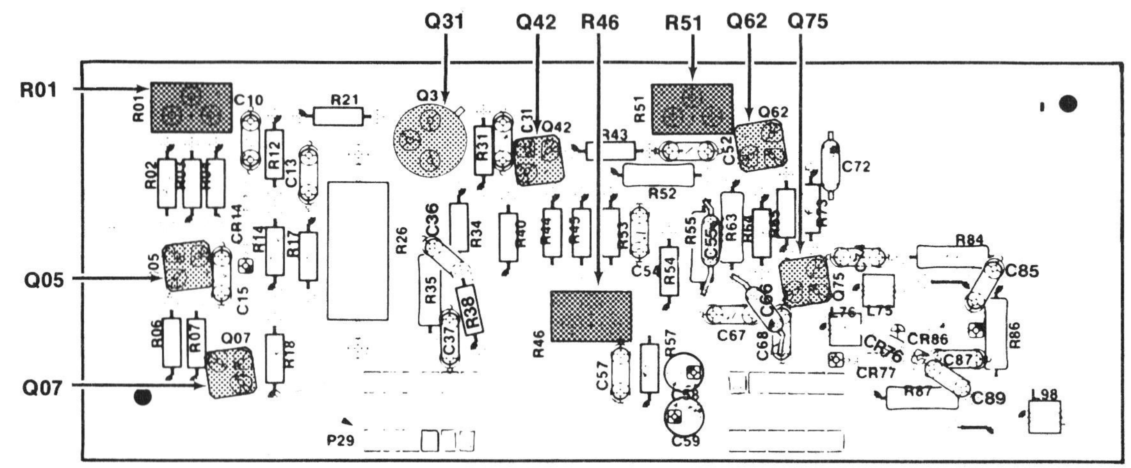
A20 IF FILTER-AMPLIFIER BOARD
(SN B010135—UP)



A21 IF ATTENUATOR-AMPLIFIER BOARD
(SN B010120—UP)



A20 IF FILTER-AMPLIFIER BOARD
(SN B000100—B010134)



A21 IF ATTENUATOR-AMPLIFIER BOARD
(SN B000100—B000119)

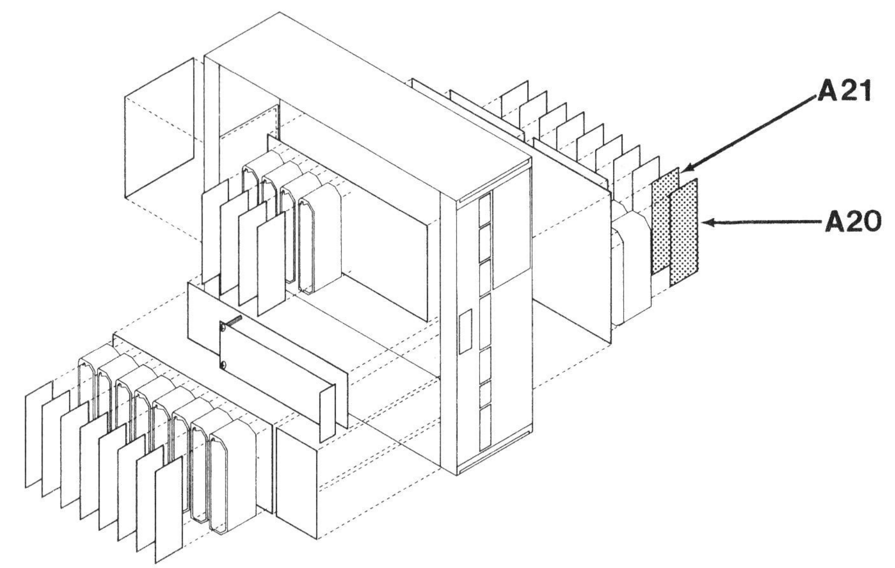
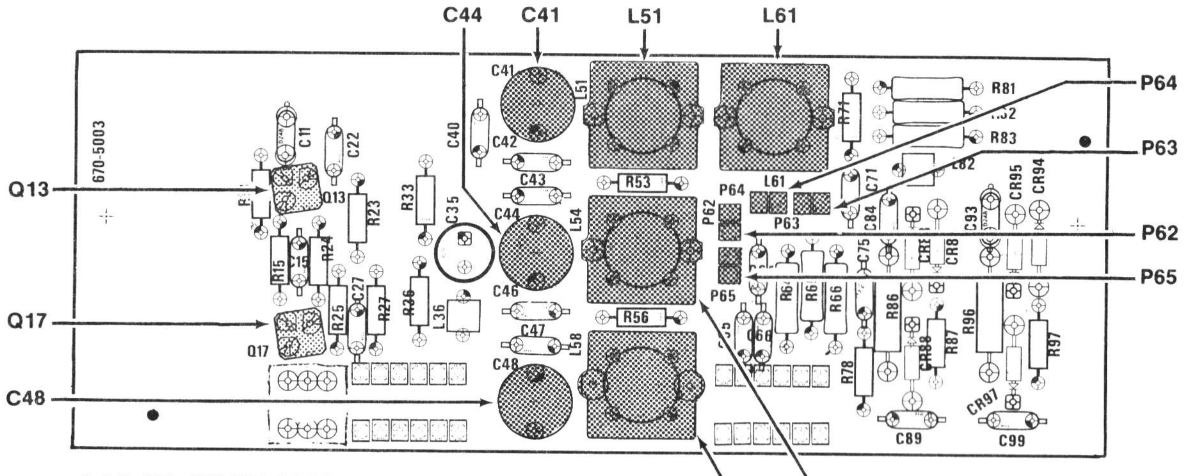
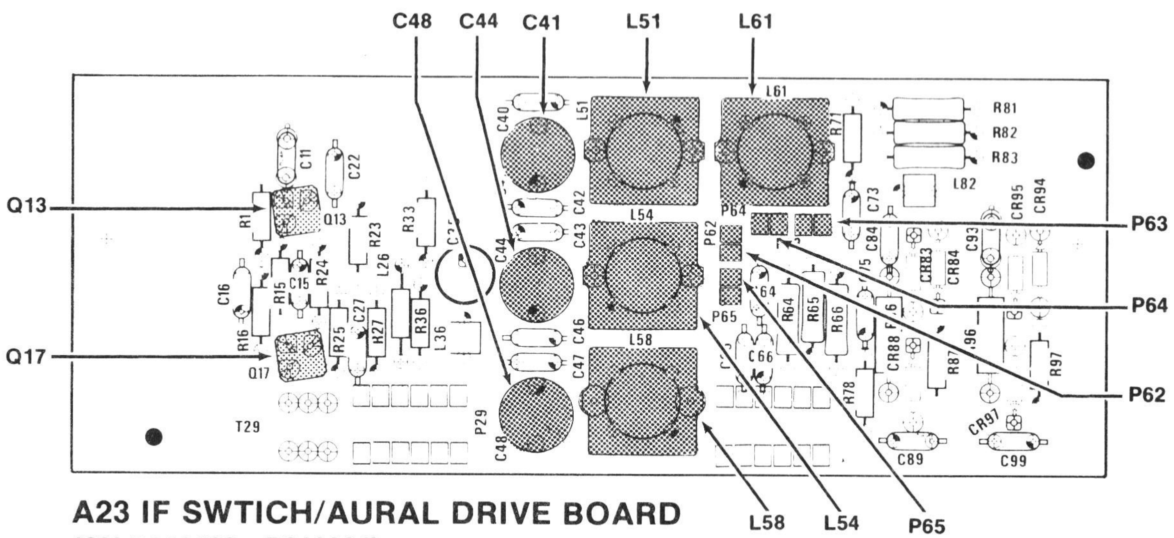


Fig. 8-1. CIRCUIT BOARD ADJUSTMENTS AND JUMPER LOCATIONS.

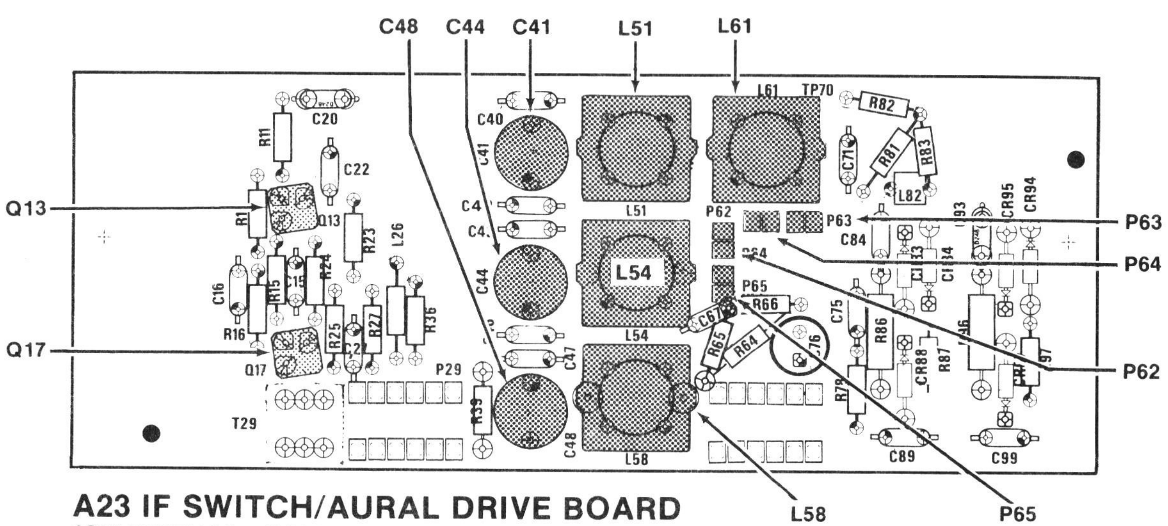
2200-119



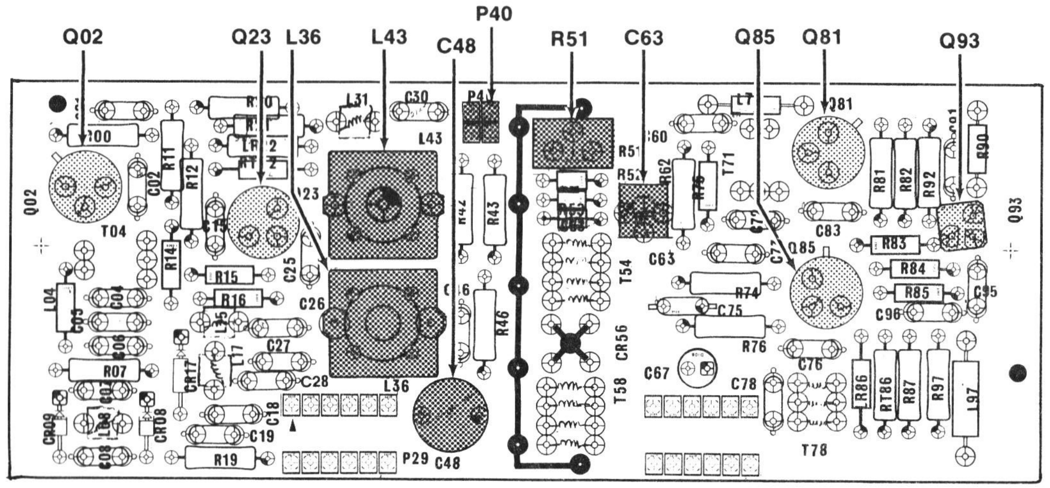
A23 IF SWITCH/AURAL DRIVE BOARD
(SN B010335 & UP)



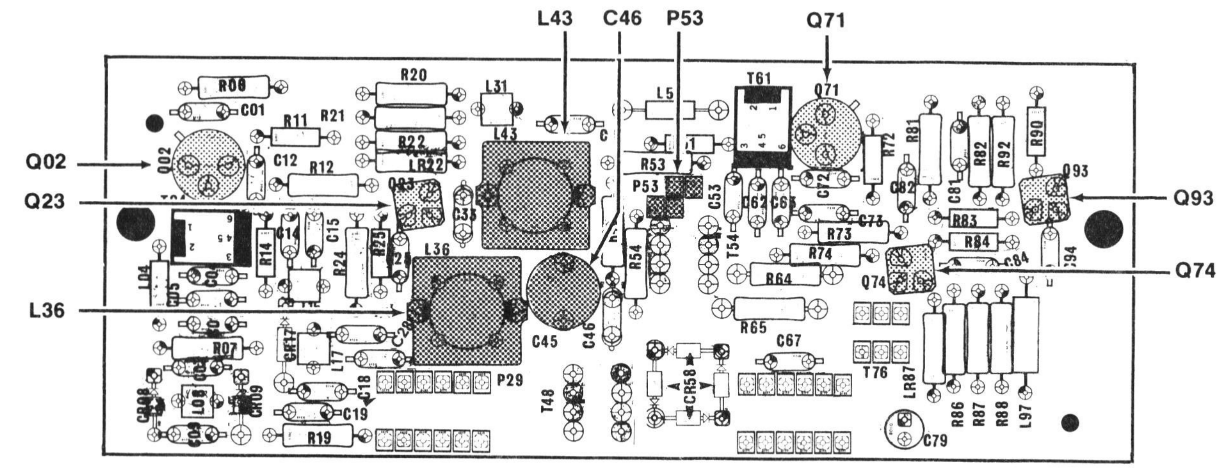
A23 IF SWTICH/AURAL DRIVE BOARD
(SN B010120—B010334)



A23 IF SWITCH/AURAL DRIVE BOARD
(SN B000100—B000119)



A22 IF ATTENUATOR-MIXER-FILTER BOARD
(SN B010120—UP OPT. 1 & 2)
(SN B010401—UP OPT. 3 STD.)



A22 IF ATTENUATOR-MIXER-FILTER BOARD
(SN B000100—B000119 OPT. 1 & 2)
(SN B000100—B010400 OPT. 3 STD)

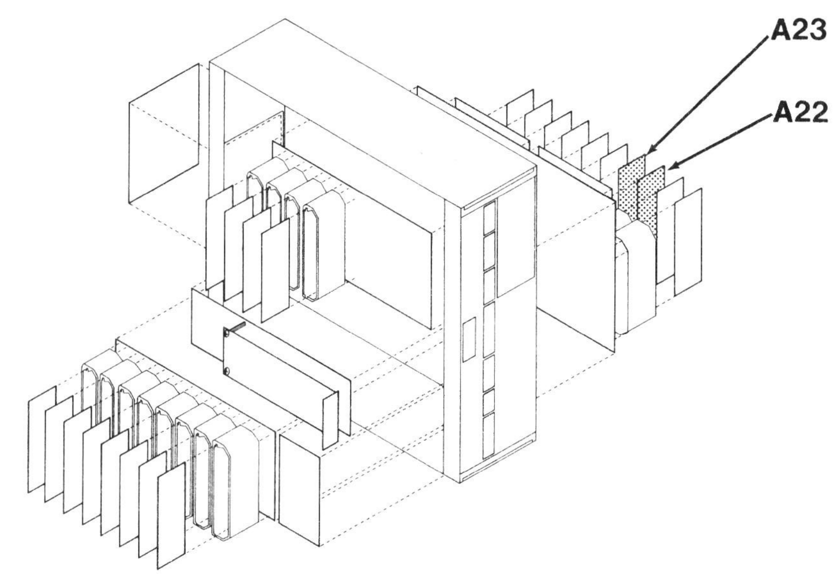
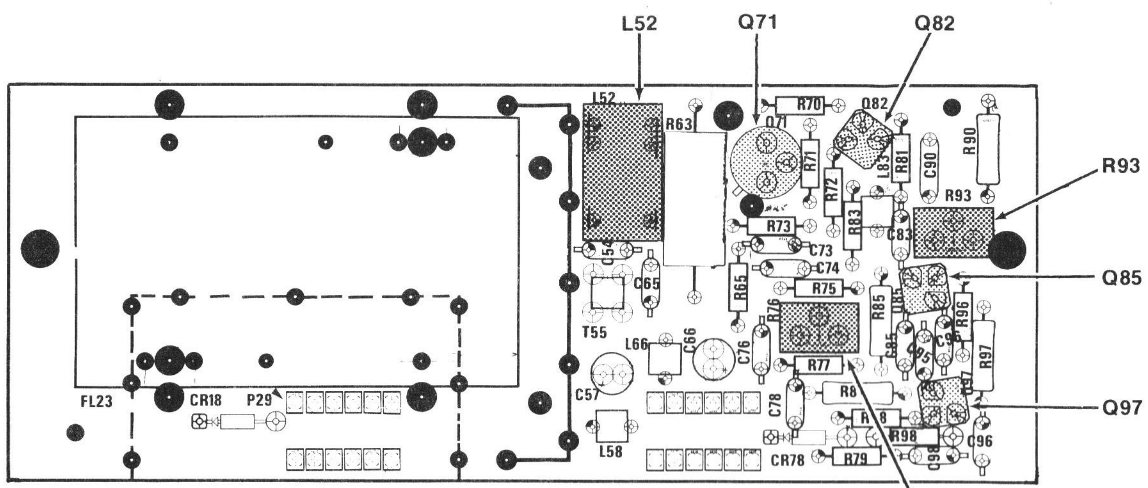


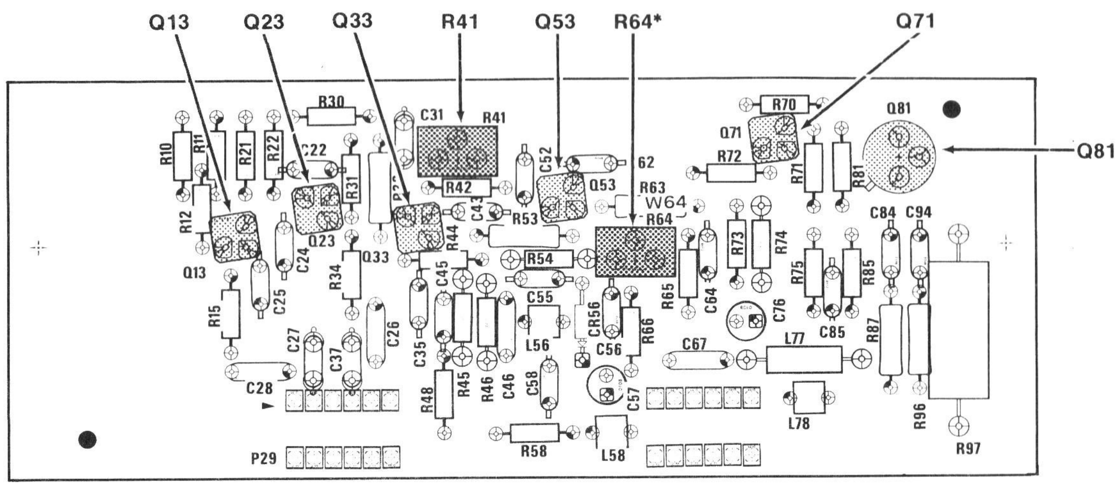
Fig. 8-2. CIRCUIT BOARD ADJUSTMENTS AND JUMPER LOCATIONS.

2200-120

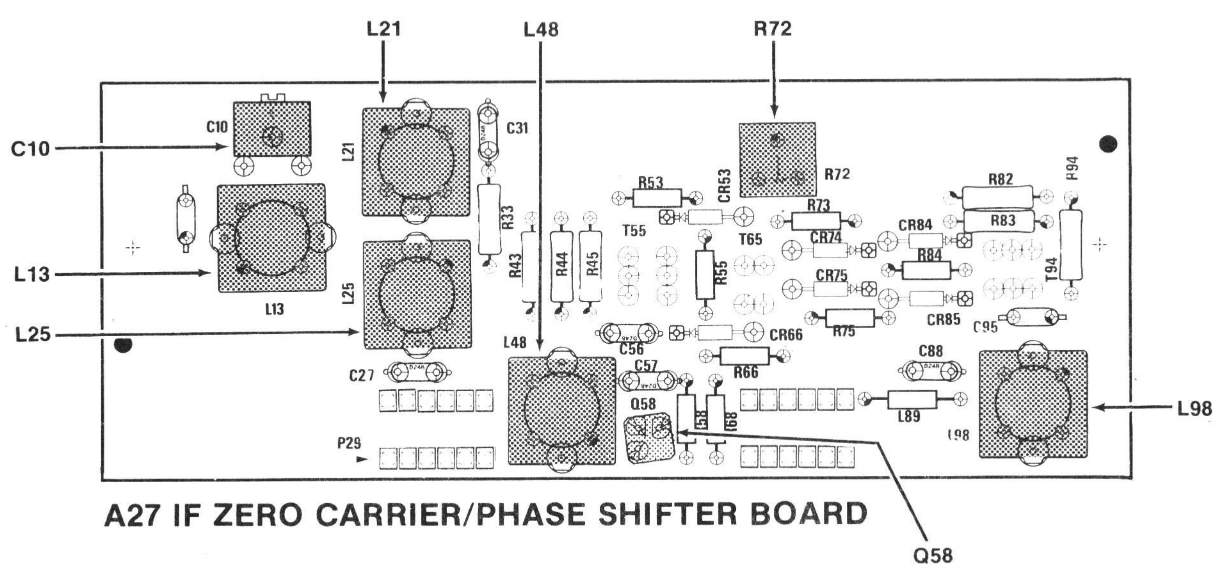


A24 IF SAW AMPLIFIER (NARROW BAND) BOARD
A25 IF SAW AMPLIFIER (WIDE BAND) BOARD

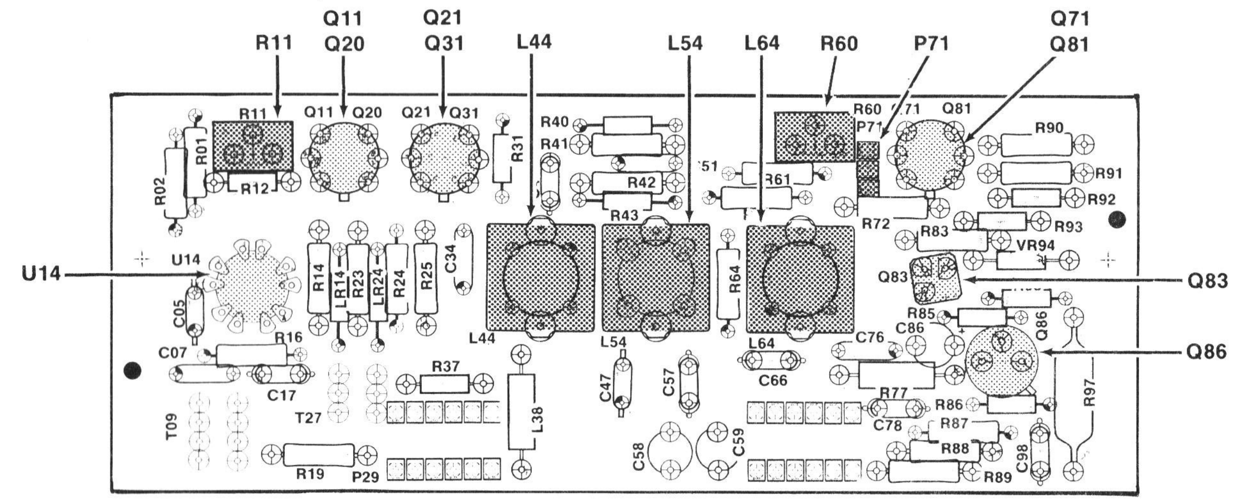
R76 ADJUSTABLE FOR SN B010774 & BELOW ONLY



A26 IF POST AMPLIFIER BOARD



A27 IF ZERO CARRIER/PHASE SHIFTER BOARD



A28 IF DETECTOR-VIDEO AMPLIFIER (QUADRATURE) BOARD
A29 IF DETECTOR-VIDEO AMPLIFIER (VIDEO) BOARD

*See Parts List for serial number ranges.

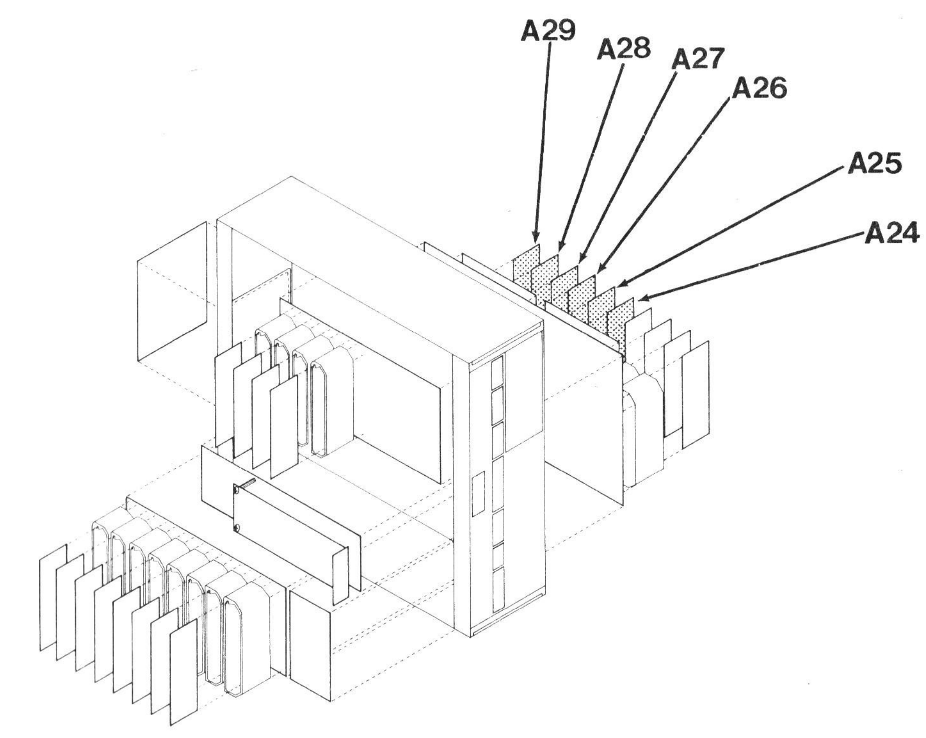
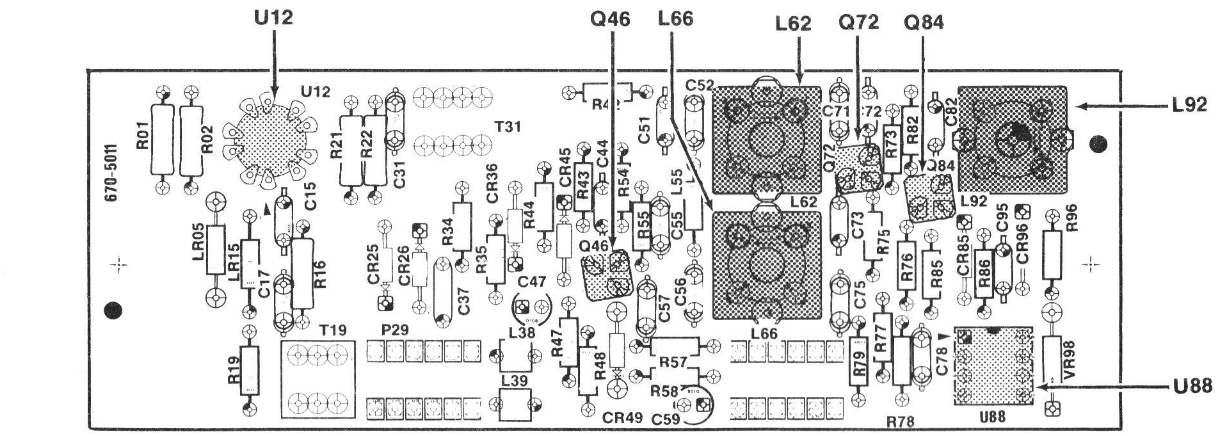
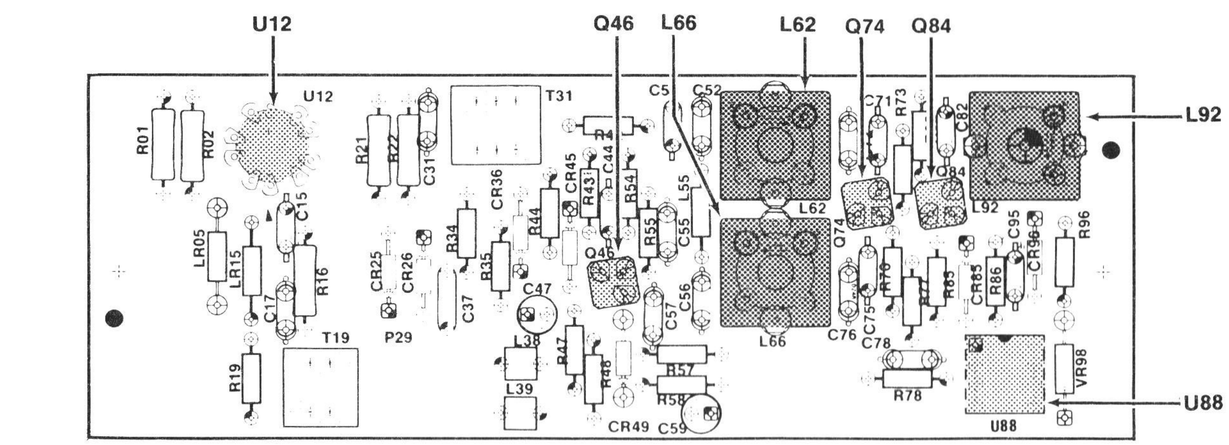


Fig. 8-3. CIRCUIT BOARD ADJUSTMENTS AND JUMPER LOCATIONS.

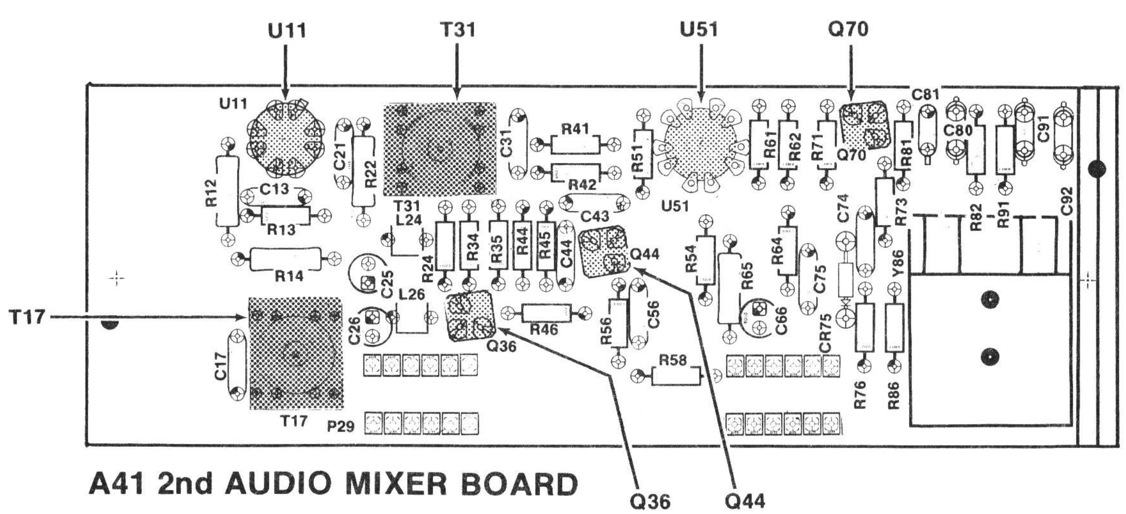
2200-121



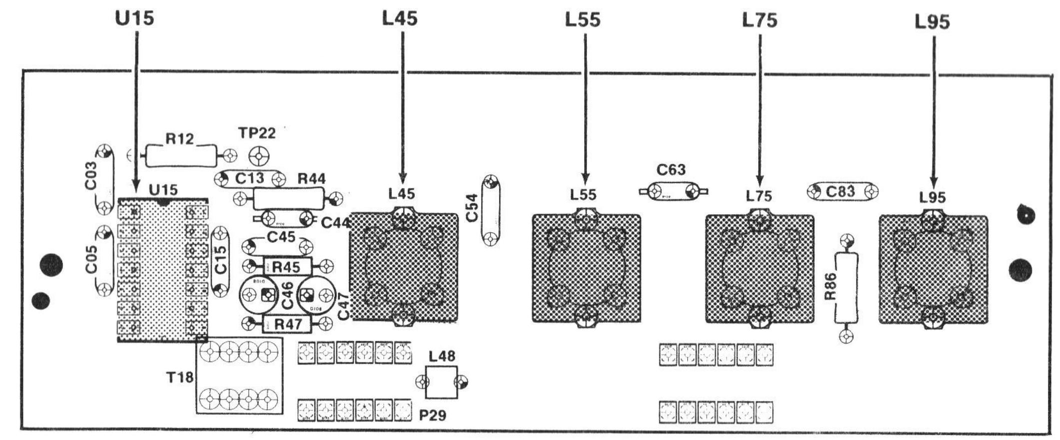
A40 1st AUDIO MIXER BOARD
(SN B010215—UP)



A40 1st AUDIO MIXER BOARD
(SN B000100—B010214)



A41 2nd AUDIO MIXER BOARD



A42 AUDIO LIMITER BOARD

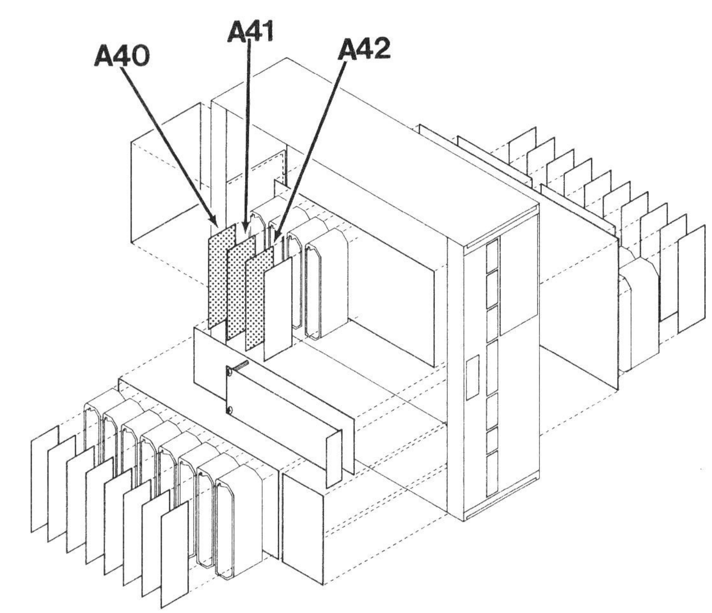
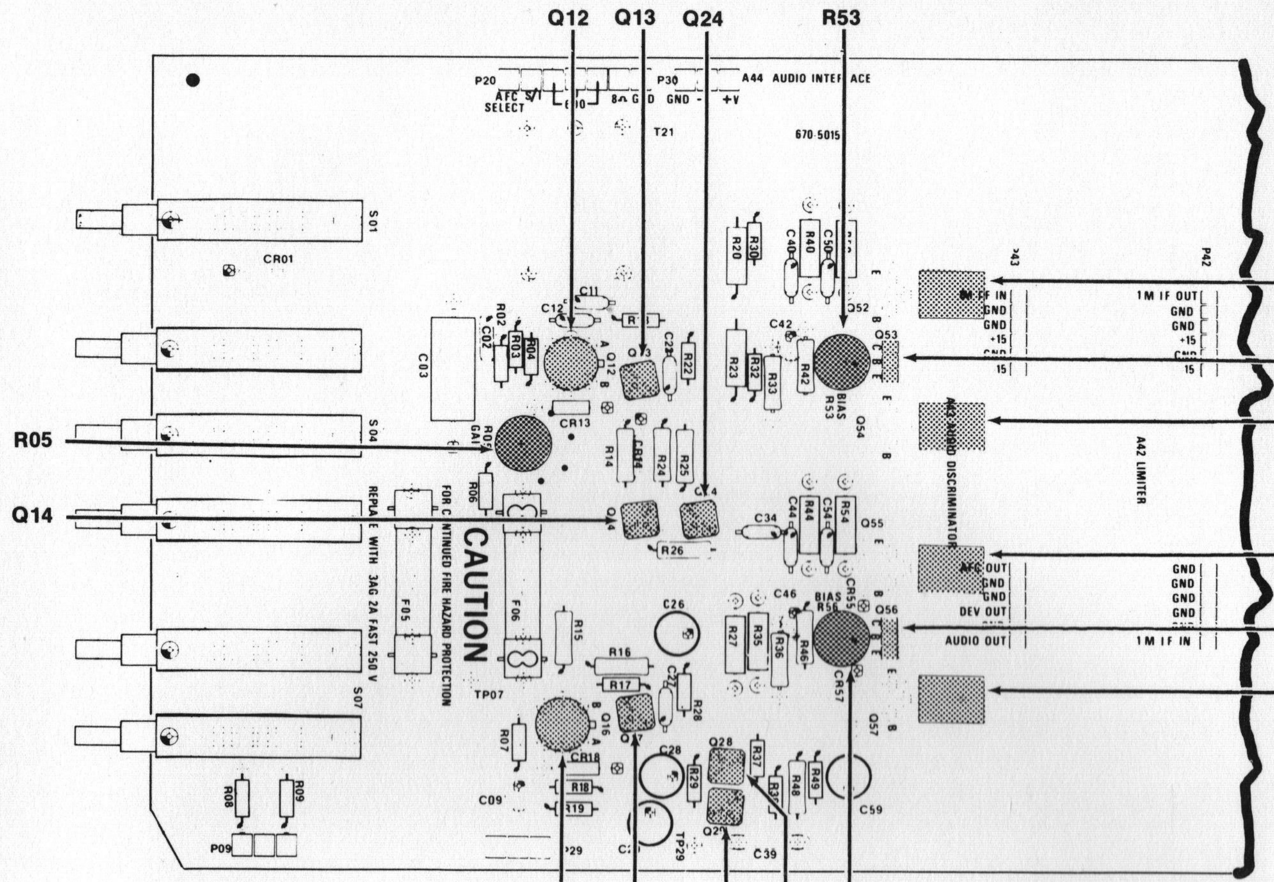
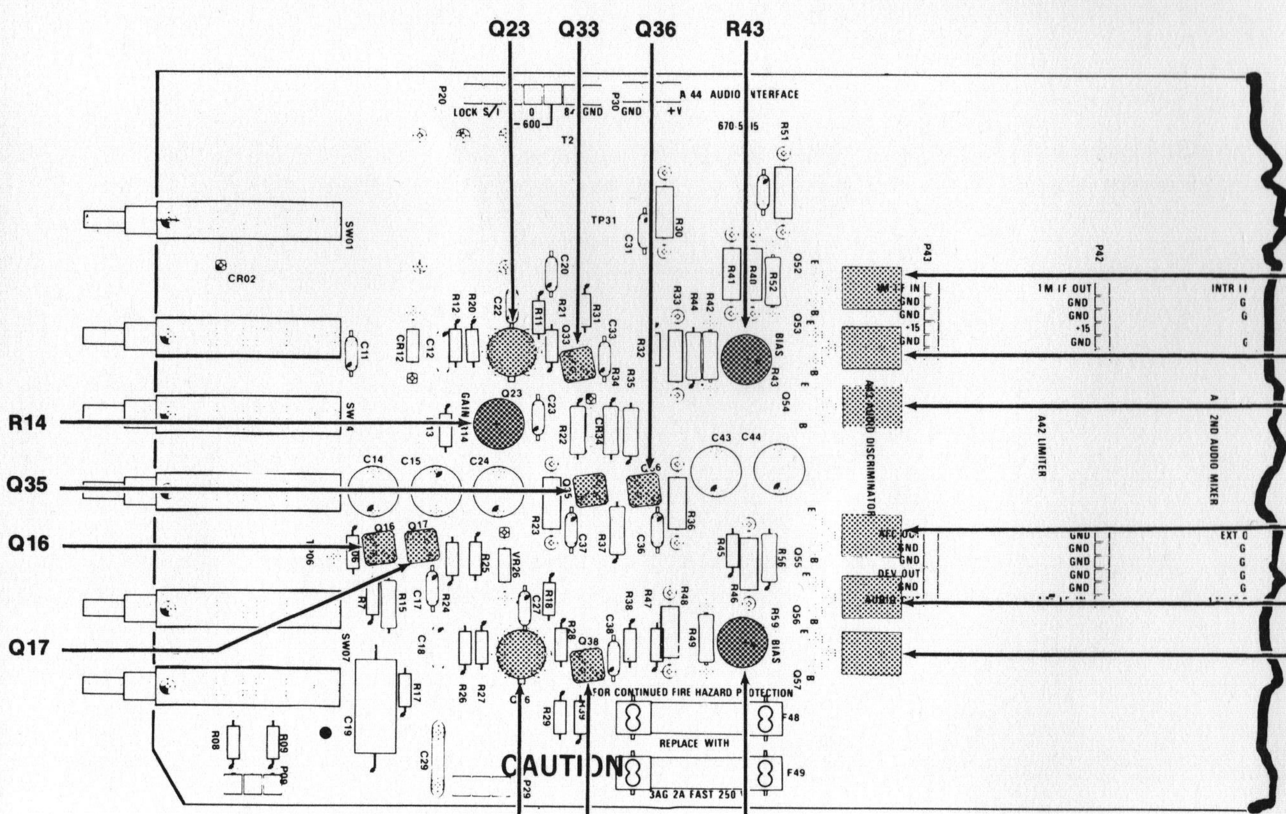


Fig. 8-4. CIRCUIT BOARD ADJUSTMENT LOCATIONS.

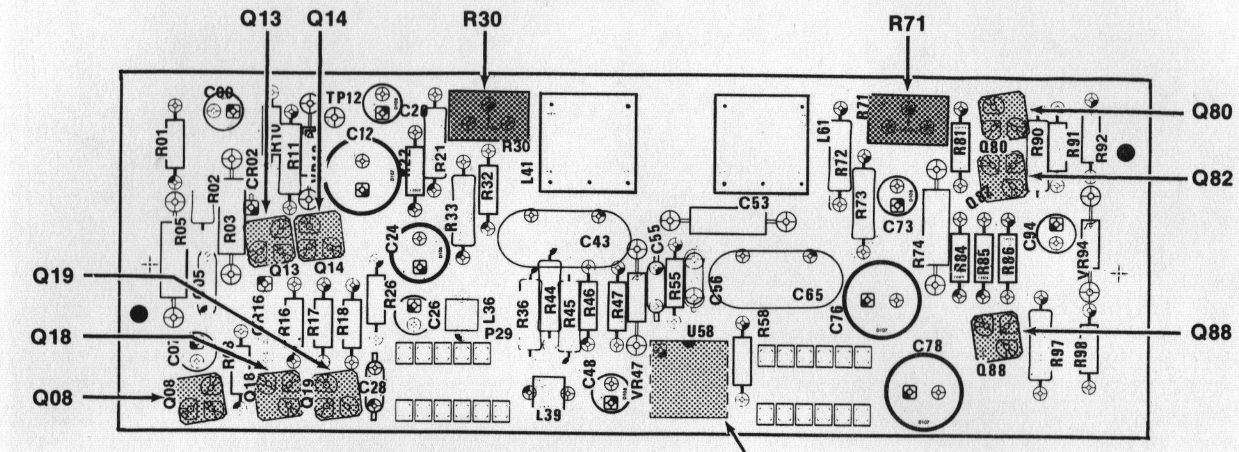
2200-122



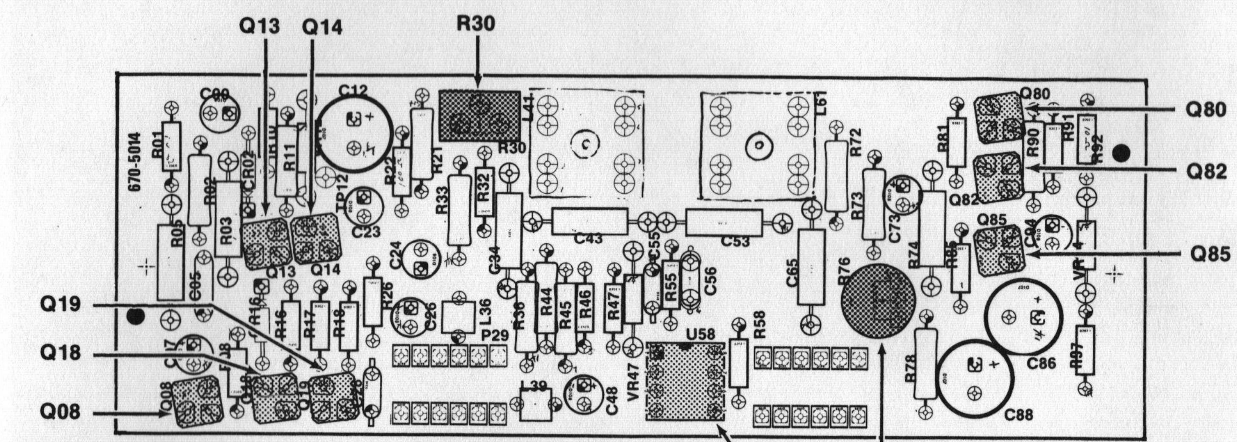
A44 AUDIO INTERFACE BOARD
(SN B010188—UP)



A44 AUDIO INTERFACE BOARD
(SN B000100—B010187)



A43 AUDIO DISCRIMINATOR BOARD
(SN B010384—UP)



A43 AUDIO DISCRIMINATOR BOARD
(SN B000100—B010383)

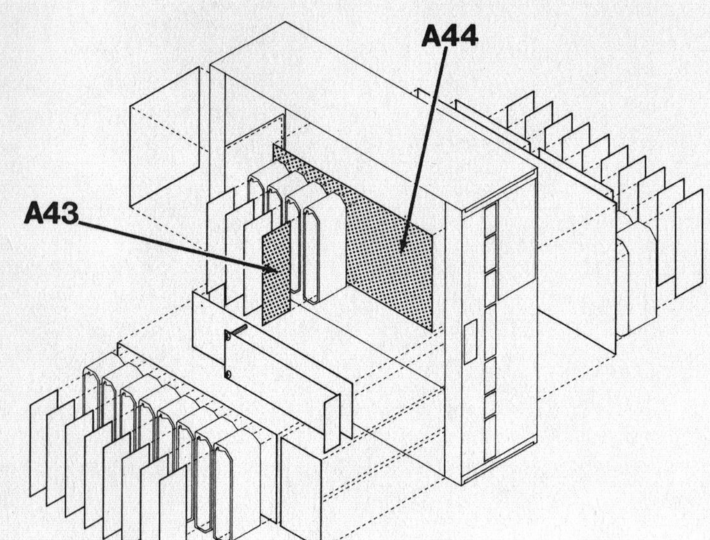


Fig. 8-5. CIRCUIT BOARD ADJUSTMENT LOCATIONS.

2200-123

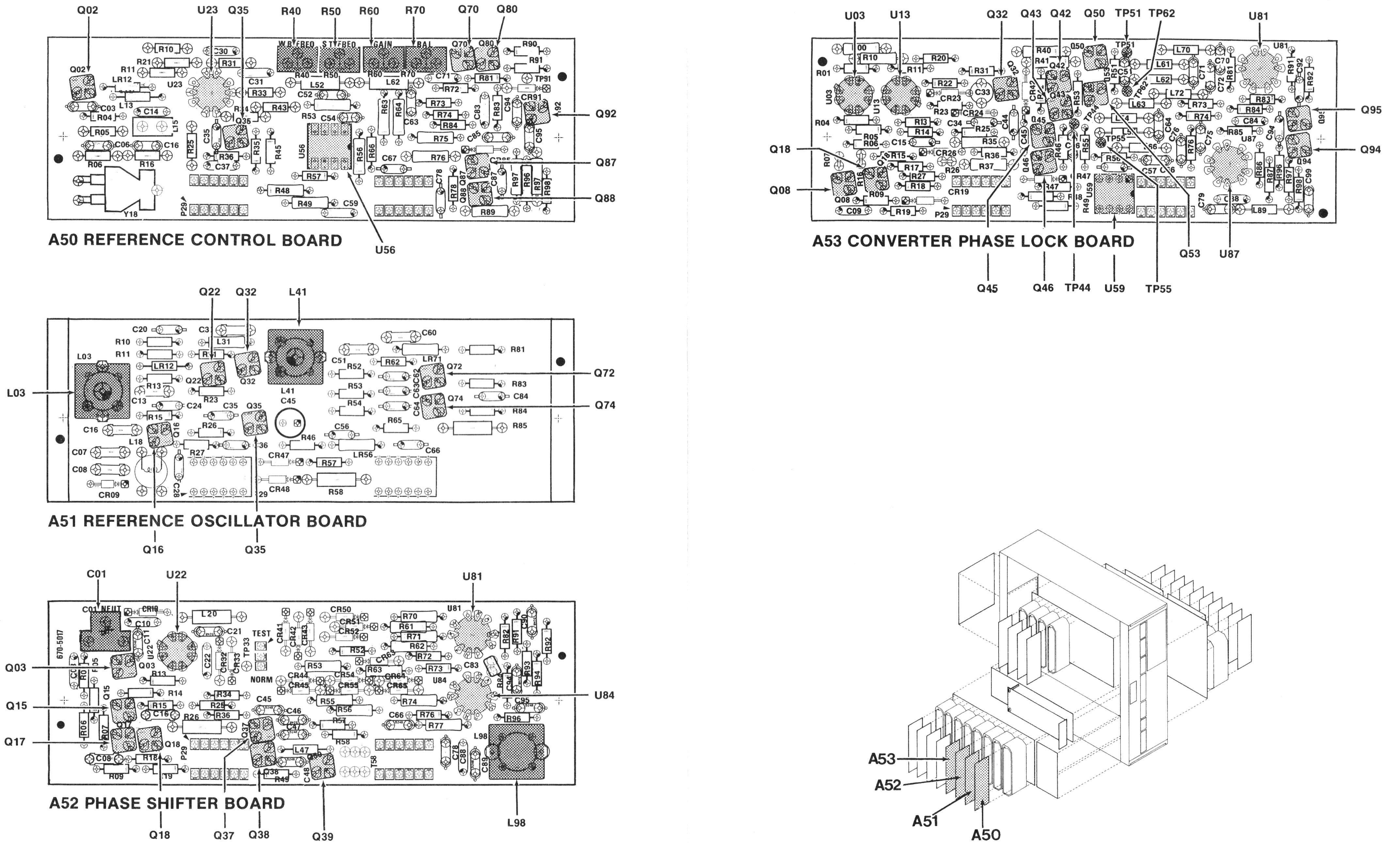
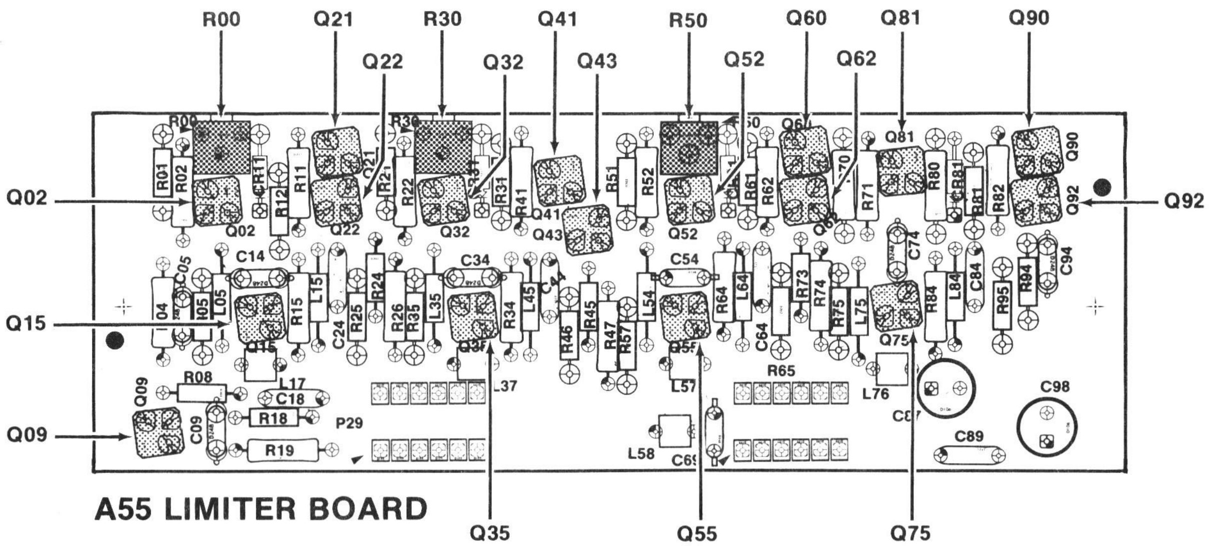


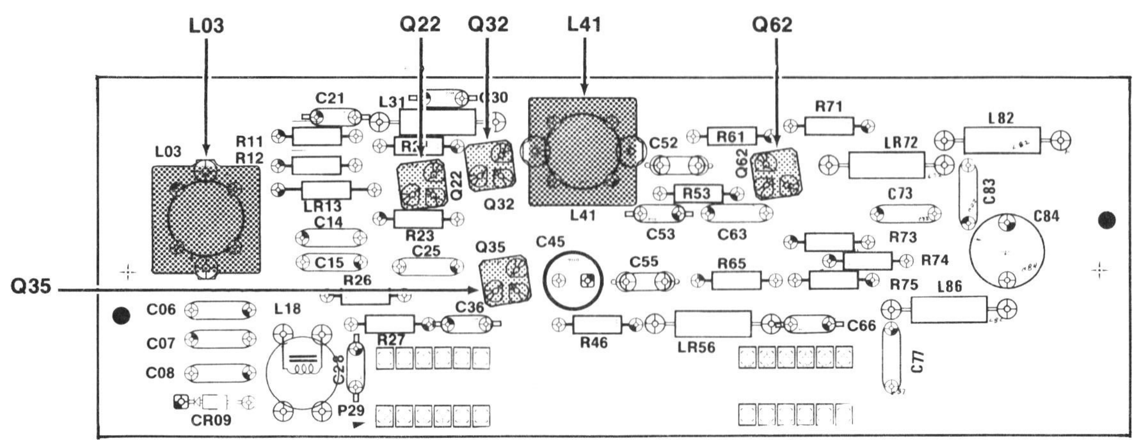
Fig. 8-6. CIRCUIT BOARD ADJUSTMENTS AND JUMPER LOCATIONS.

2200-124

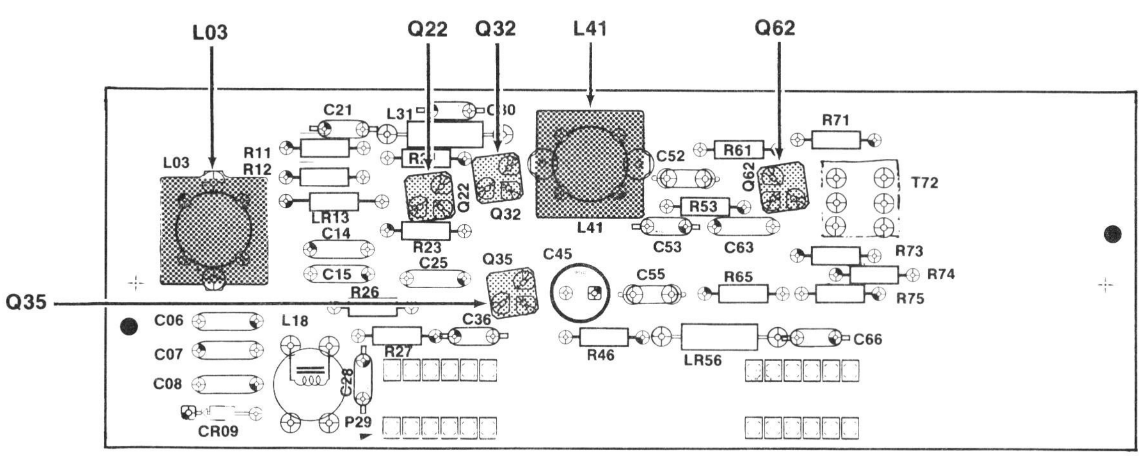
ADJUSTMENT LOCATIONS A50, A51, A52, A53



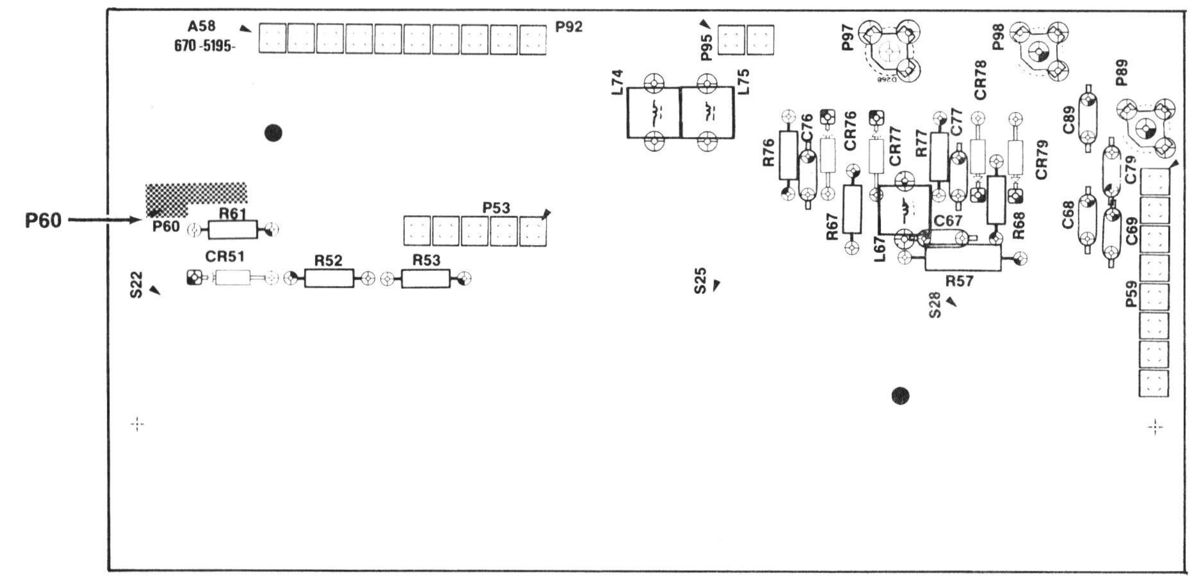
A55 LIMITER BOARD



A57 CONVERTER OSCILLATOR BOARD
(SN B010120—UP)



A57 CONVERTER OSCILLATOR BOARD
(SN B000100—B000119)



A58 PHASE LOCK SWITCH BOARD

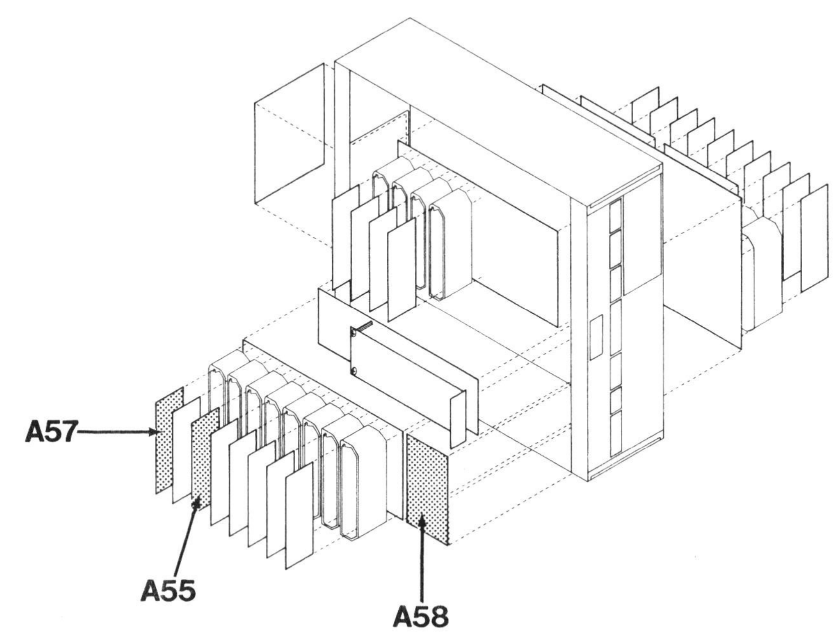
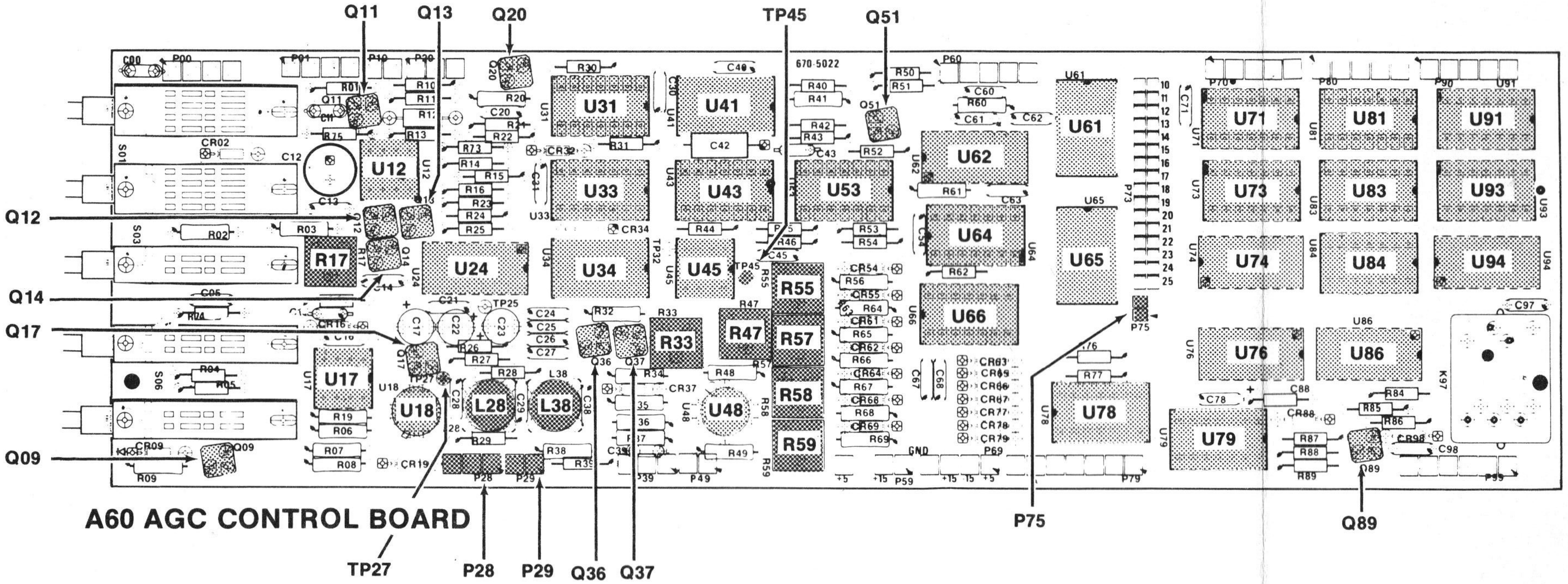


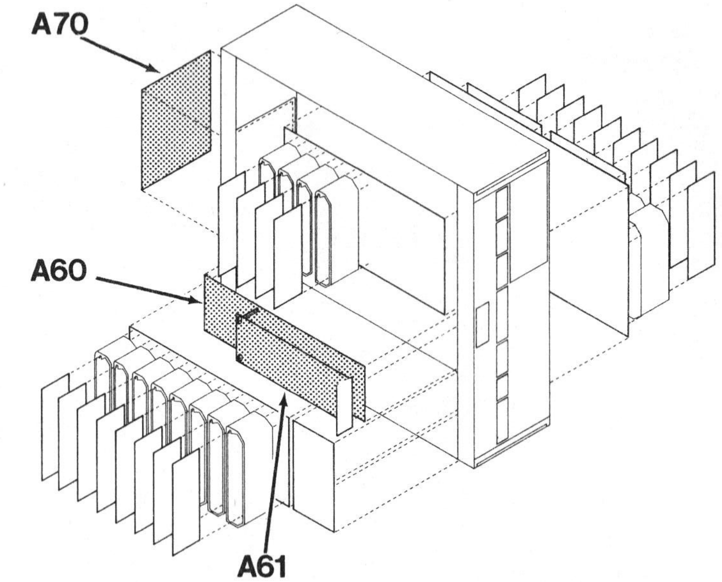
Fig. 8-7. CIRCUIT BOARD ADJUSTMENTS AND JUMPER LOCATIONS.

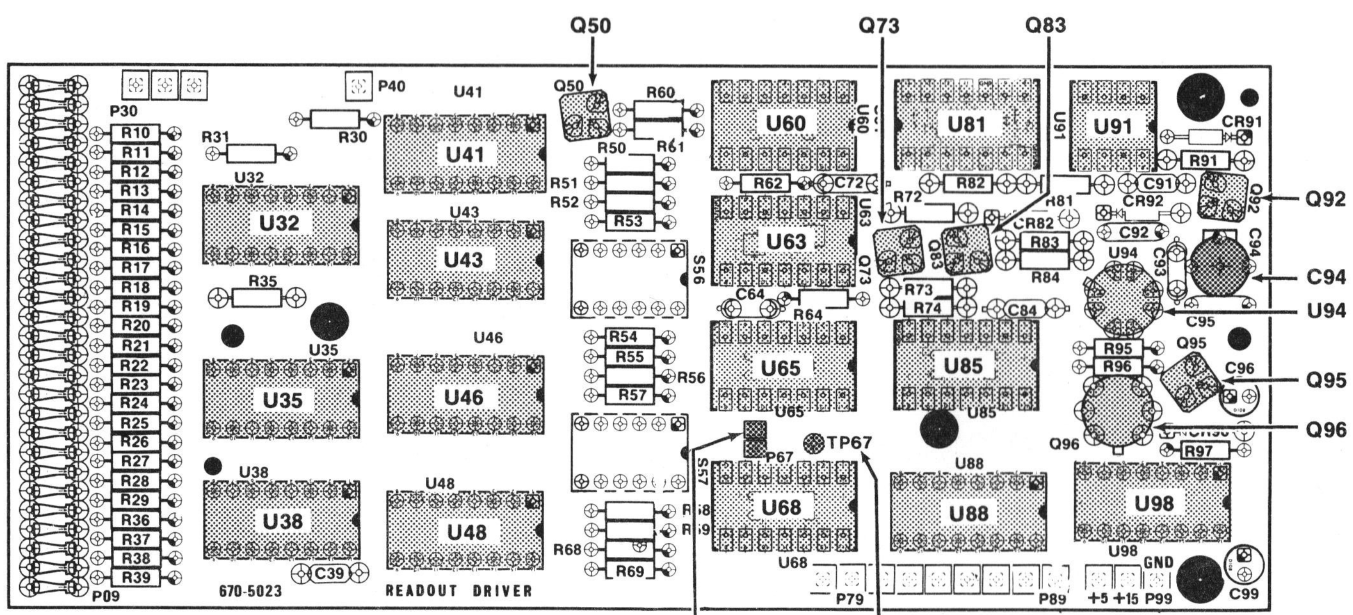
2200-125

ADJUSTMENT LOCATIONS
A55, A57, A58

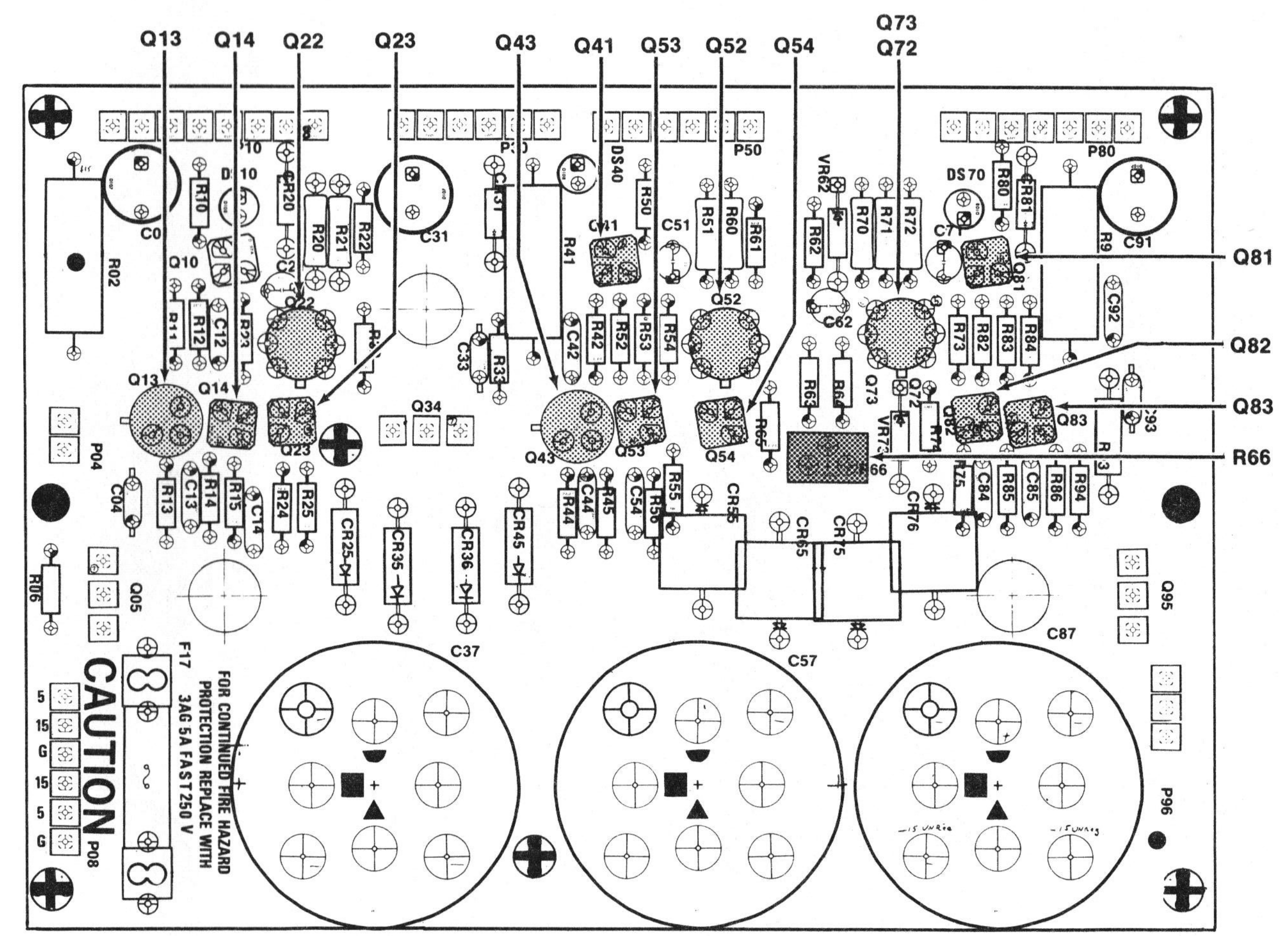


A60 AGC CONTROL BOARD





A61 READOUT DRIVER BOARD

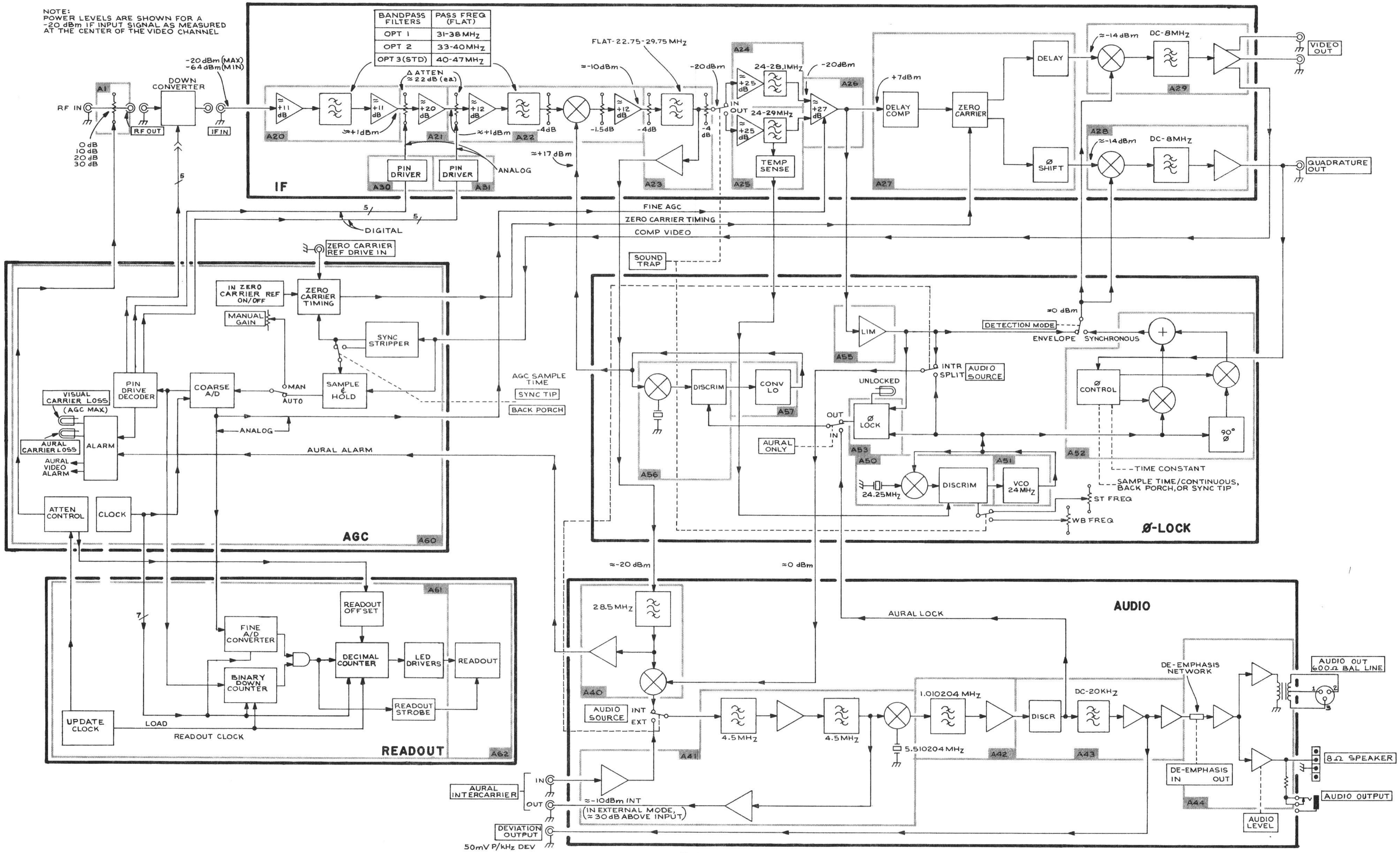


A70 POWER SUPPLY BOARD

Fig. 8-8. CIRCUIT BOARD ADJUSTMENTS AND JUMPER LOCATIONS.

2200-126

NOTE:
POWER LEVELS ARE SHOWN FOR A -20 dBm IF INPUT SIGNAL AS MEASURED AT THE CENTER OF THE VIDEO CHANNEL

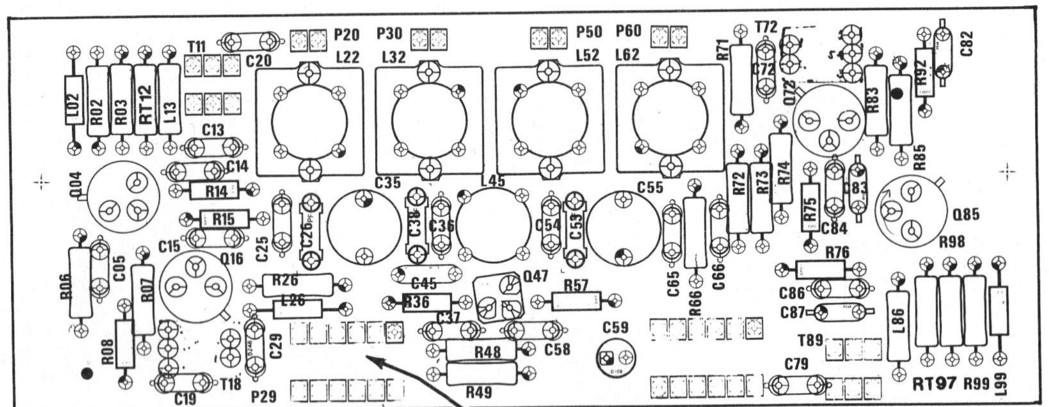


1450-1

2200-148

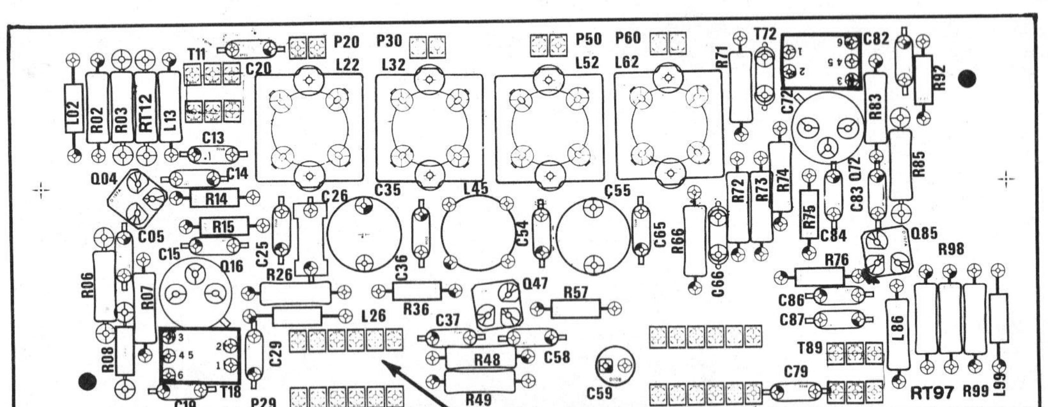
BLOCK DIAGRAM

A | B | C | D | E | F | G | H | I | J | K | L | M



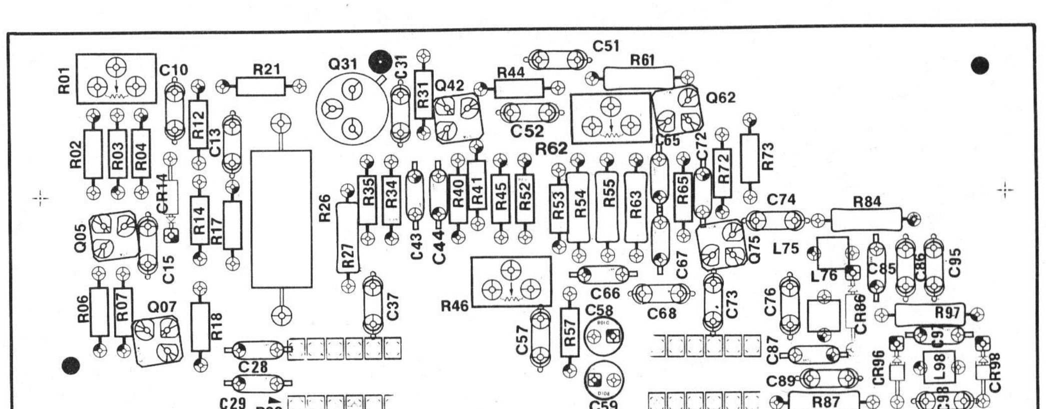
A20 IF FILTER AMP BOARD
(SN B010135—UP)

C28B
R28B
(On back of board)

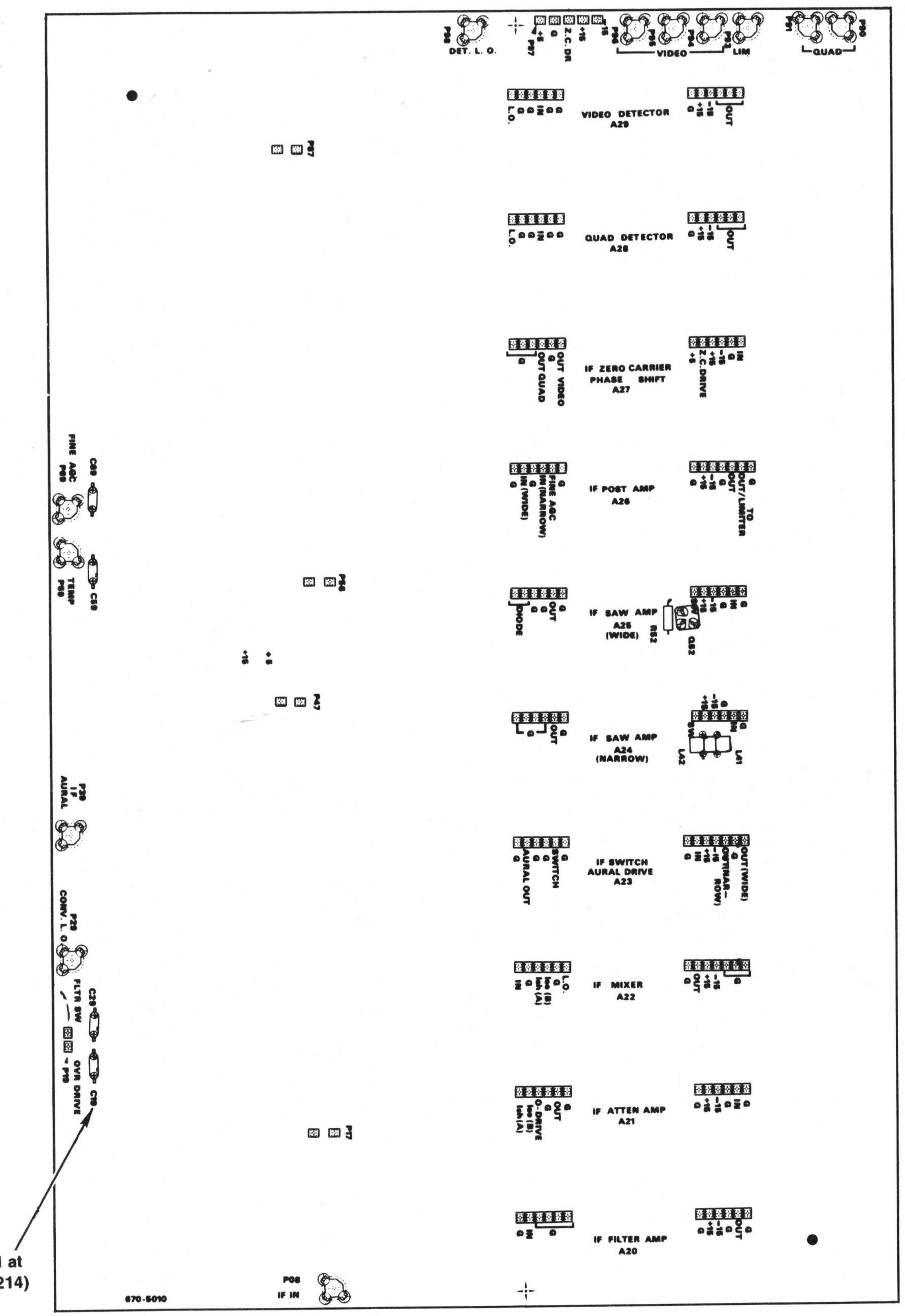


A20 IF FILTER AMP BOARD
(SN B010120—B010134)

C28B
R28B
(Added on back of board at SN B010120)



A21 IF ATTENUATOR-AMPLIFIER BOARD
(SN B010120—UP)



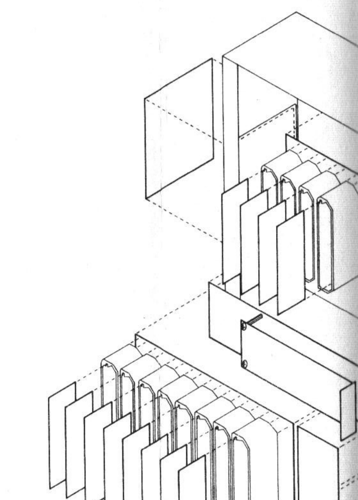
C19
(Removed at SN B0101214)

A32 IF INTERFACE BOARD

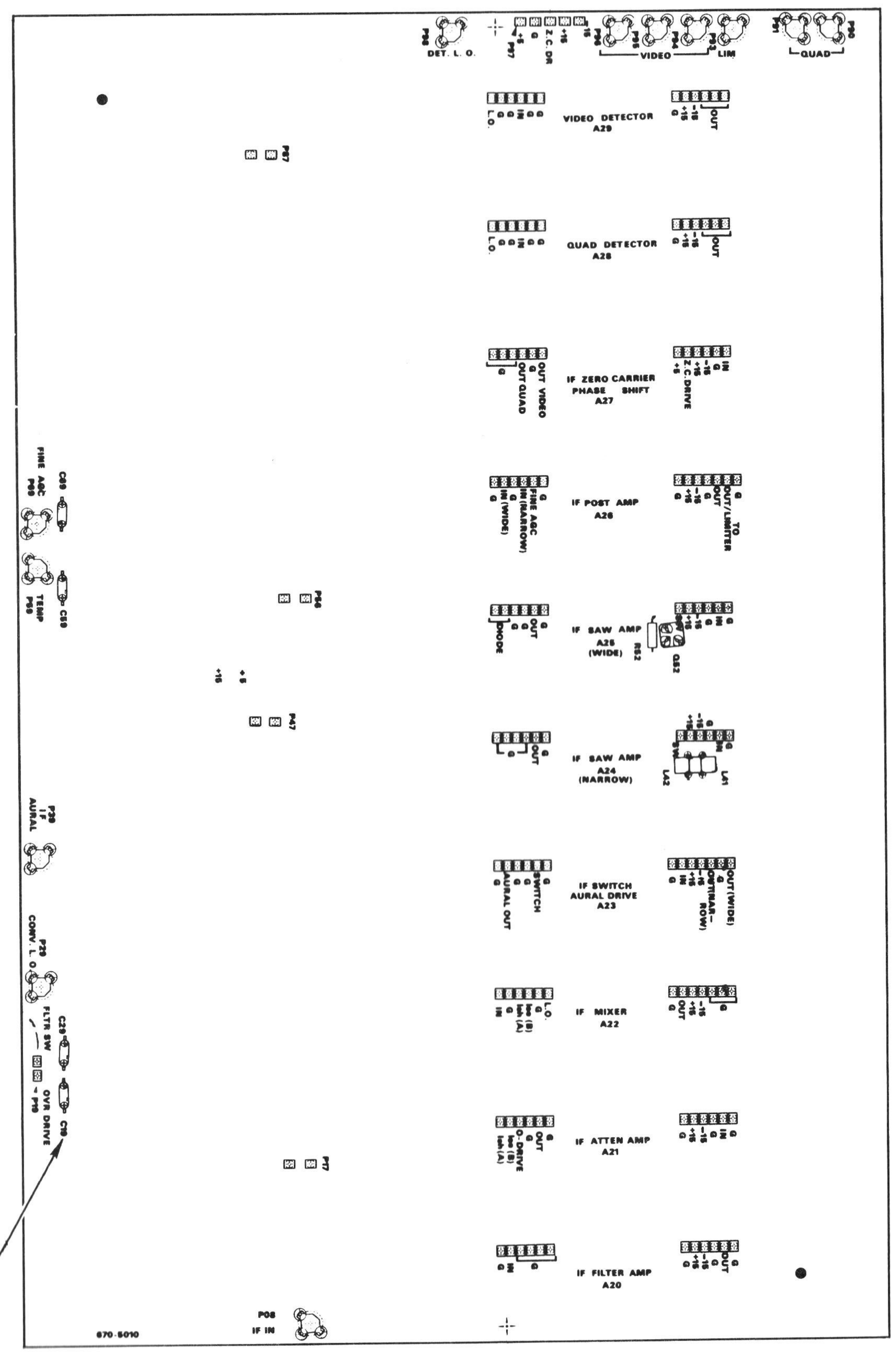
C23, C24
(On back of board)

REV MAY 1982

Circuit Number	Schematic Location
ASSY A20	
C05	B2
C13	A2
C14	A2
C15	A1
C19	A2
C20	A3
C25	B3
C26	B3
C28B	B1
C29	B1
C35	B3
C36	A3
C37	A1
C38	A3
C45	B3
C53	A3
C54	A3
C55	B3
C58	A1
C59	A4
C65	B3
C66	A4
C72	A4
C79	A5
C82	A4
C83	A4
C84	A4
C86	A5
C87	A5
L02	A2
L22	A3
L26	B1
L32	A3
L45	B3
L52	A3
L62	A3
L99	A5
LR13	B2
LR86	A5
Q04	B1
Q16	B1
Q47	A1
Q72	A4
Q85	A5
R02	A2
R03	A2
R06	B2
R07	B2
R08	A2
R14	A2
R15	A1



G | H | I | J | K | L | M



C19 (Removed at SN B0101214)

A32 IF INTERFACE BOARD

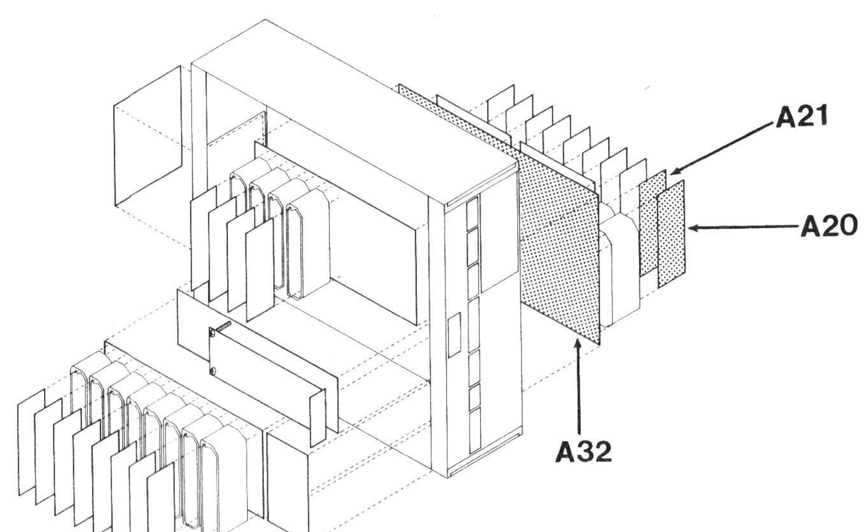
C23, C24 (On back of board)

REV MAY 1982

IF Input ⟨1⟩

Circuit Number	Schematic Location	Board Location
ASSY A20		
C05	B2	A2,A5
C13	A2	B1,B5
C14	A2	B2,B5
C15	A1	B2,B5
C19	A2	B3,B6
C20	A3	B1,B4
C25	B3	B2,B5
C26	B3	B2,B5
C28B	B1	B3,B6
C29	B1	B3,B6
C35	B3	C2,C5
C36	A3	C2,C5
C37	A1	C2,C6
C38	A3	C2
C45	B3	C2
C53	A3	D2
C54	A3	C2,C5
C55	B3	D2,D5
C58	A1	C3,C6
C59	A4	D2,D6
C65	B3	D2,D5
C66	A4	D2,D5
C72	A4	E1,E4
C79	A5	E3,E6
C82	A4	F1,E4
C83	A4	E2,E5
C84	A4	E2,E5
C86	A5	E2,E5
C87	A5	E2,E6
L02	A2	A1,A4
L22	A3	B1,B4
L26	B1	B2,C5
L32	A3	C1,C4
L45	B3	C2,C5
L52	A3	D1,D4
L62	A3	D1,D4
L99	A5	F3,F6
LR13	B2	A1,A4
LR86	A5	E2,E6
Q04	B1	A2,A5
Q16	B1	B2,B5
Q47	A1	C2,C5
Q72	A4	E1,E5
Q85	A5	F2,E5
R02	A2	A1,A4
R03	A2	A1,A4
R06	B2	A2,A5
R07	B2	A2,A5
R08	A2	A3,A6
R14	A2	B2,B5
R15	A1	B2,B5
R26	B1	B2,B5
R28B	B1	B3,B6
R36	A1	C2,C5
R48	A1	C3,C6
R49	A1	C3,C6
R57	A1	D2,D5
R66	A4	D2,D5
R71	A4	D1,D4
R72*	A4	D2,D5
R73	A4	E2,E5
R74	A4	E2,E5
R75	A4	E2,E5
R76	A5	E2,E5
R83	A4	E1,E4
R85	A4	E2,E5
R92	A4	E1,E4
R98	A5	F2,F5
R99	A5	F3,F6
RT12	A2	A1,A4
RT97	A5	E3,E6
T11	B1	B1,B4
T18	B2	B3,B6
T72	A4	E1,E4
T89	A5	E3,E6
ASSY A21		
C10	D4	B7
C13*	C4	B8
C15*	C4	A8
C28	D1	B9
C29	C1	B9
C31	C3	C7
C37	C4	C9
C43	D4	C8
C44	D3	C8
C51	C3	D7
C52	C3	C8
C57	D3	C9
C58	D3	D9
C59	C5	D9
C65	C3	D8
C66	D3	D8
C67	D3	D8
C68	C3	D9
C72	C3	D8
C73	C3	D9
C74	C2	E8
C76	C2	E9
C85	C2	E8
C86	C2	E8
C87	C2	E9
C89	C2	E9
C95	C2	F8
C97	D2	F9
C98	C2	F9
CR14*	C4	A8
CR86	C2	E9
CR96	C2	E9
CR98	C2	F9
E42	C3	
L75	C2	E8
L76	C2	E8
L98	C2	F9
Q05*	C4	A8
Q07*	C5	A9
Q31	C4	B7
Q42	C3	C7
Q62	C3	D7
Q75	C2	E8
R01*	C4	A7
R02*	C4	A8
R03*	C4	A8
R04*	C4	A8
R06*	C5	A9
R07*	C4	A9
R12	D4	B8
R14*	C4	B8
R17*	C4	B8
R18*	C4	B9
R21	D4	B7
R26	C4	B8
R27	C4	B8
R31	C3	C7
R34	C4	C8
R35	C4	C8
R40	D3	C8
R41	C3	C8
R44	C3	C7
R45	C3	C8
R46	D3	C9
R52	C3	C8
R53	D3	D8
R54	D3	D8
R55	D3	D8
R57	D3	D9
R61	C3	D7
R62	C3	D8
R63	D3	D8
R65	D2	D8
R72	C3	D8
R73	C3	E8
R84	C2	E8
R87	C2	E9
R97	C2	F9
P/O ASSY A32		
C19*	C5	H8
J1	B1	CHASSIS
P08	B1	I9

*See Parts List for serial number ranges.



COMPONENT NUMBER EXAMPLE

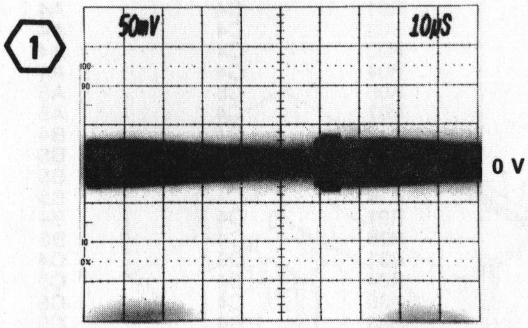
Component Number
A23 A2 R1234
Assembly Number — Subassembly Number (if used) — Schematic Circuit Number

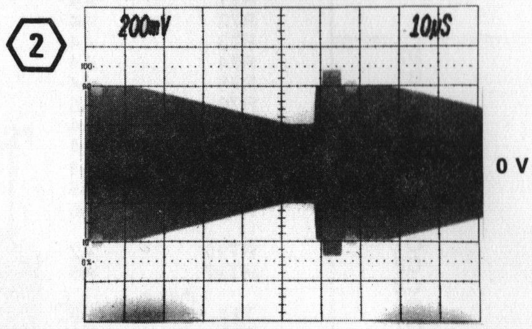
Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

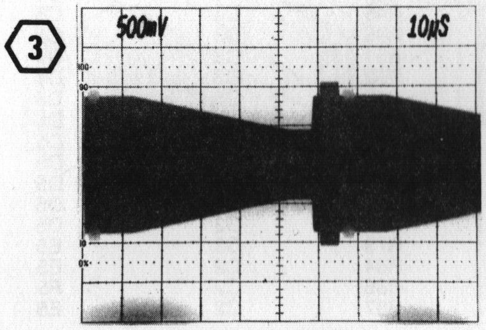
Static Sensitive Devices
See Maintenance Section

2200-127

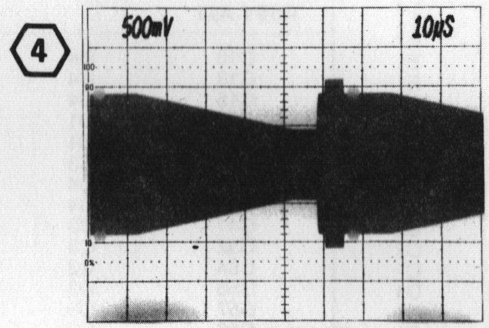
1



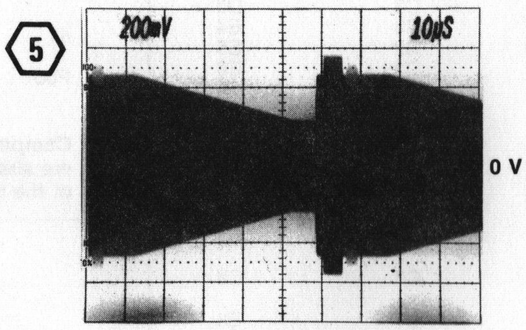


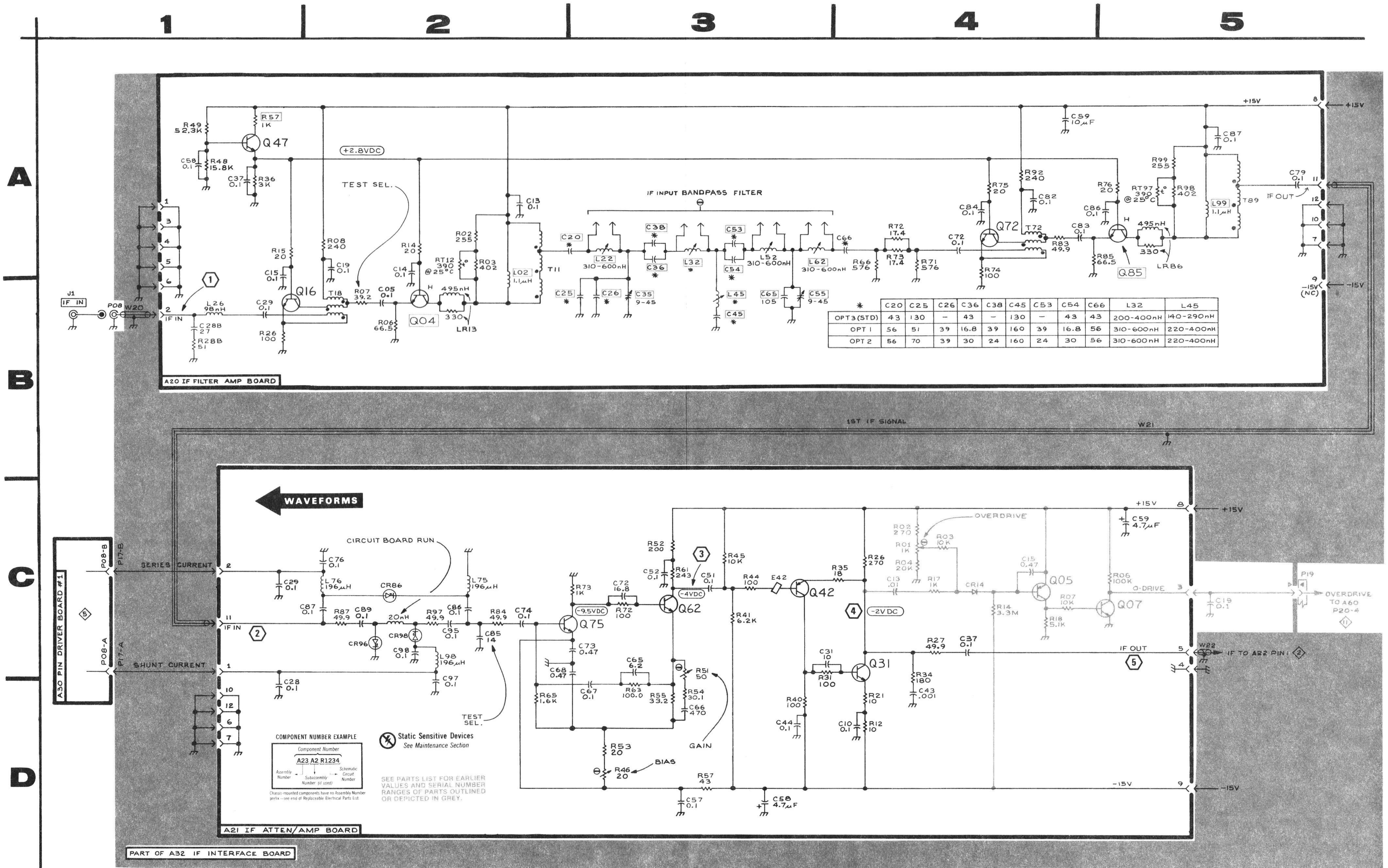


AC COUPLED



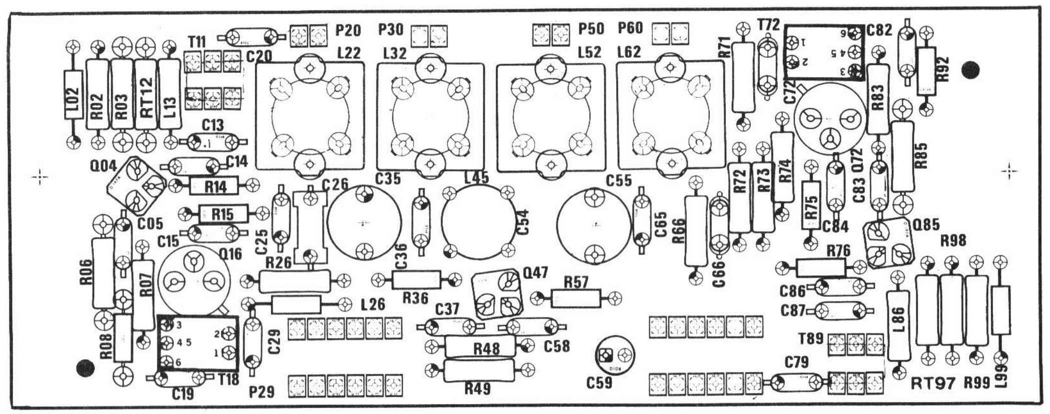
AC COUPLED



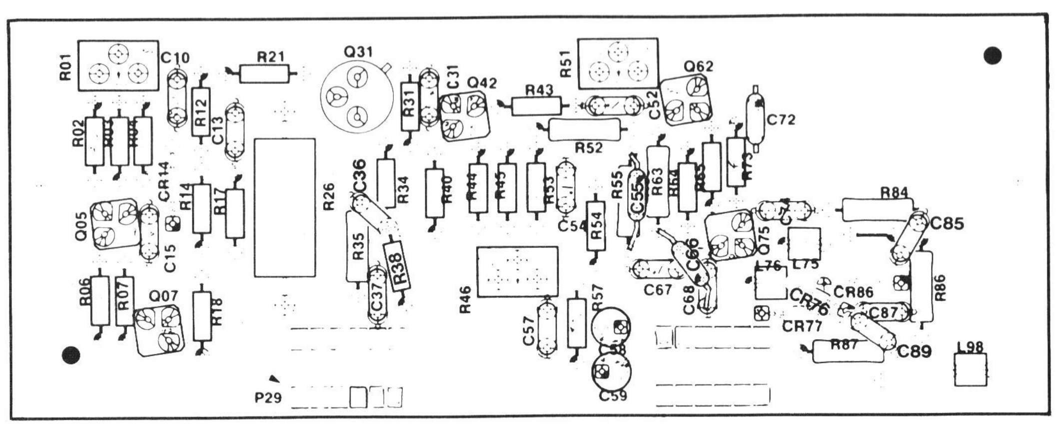


*	C20	C25	C26	C36	C38	C45	C53	C54	C66	L32	L45
OPT3(STD)	43	130	–	43	–	130	–	43	43	200-400nH	140-290nH
OPT 1	56	51	39	16.8	39	160	39	16.8	56	310-600nH	220-400nH
OPT 2	56	70	39	30	24	160	24	30	56	310-600nH	220-400nH

	A	B	C	D	E	F

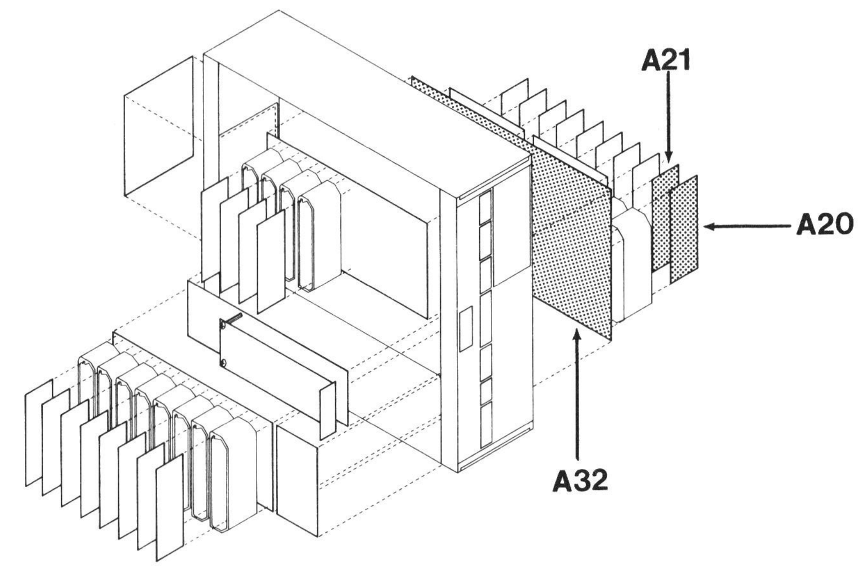


A20 IF FILTER AMP BOARD
(SN B000100—B000119)



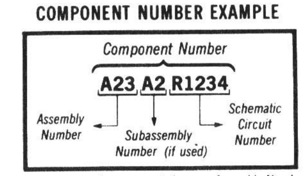
A21 IF ATTENUATOR-AMPLIFIER BOARD
(SN B000100—B000119)

C28, C77, C29, R41, C41
(On back of board)



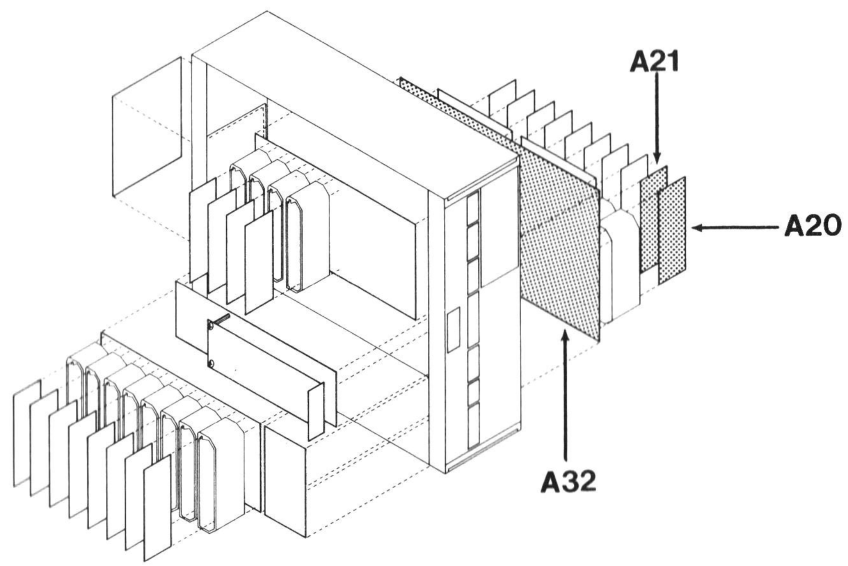
Static Sensitive Devices
See Maintenance Section

COMPONENT NUMBER EXAMPLE



Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

Circuit Number	Schematic Location
ASSY A20	
C05	B2
C13	A2
C14	A2
C15	B1
C19	A2
C20	A2
C25	B3
C26	B3
C29	B1
C35	B3
C36	A3
C37	B1
C54	A3
C55	B3
C58	A1
C59	A4
C65	B3
C66	A3
C72	A4
C79	A5
C82	A4
C83	A4
C84	A4
C86	A5
C87	A5
L02	A2
L22	A3
L26	B1
L32	A3
L45	B3
L52	A3
L62	A3
L99	A5
LR13	B2
LR86	A5
Q04	B2
Q16	B1
Q47	A1
Q72	A4
Q85	A5
R02	A2
R03	A2
R06	B2
R07	B2
R08	A2
R14	A2
R15	A1
R26	B1
R36	A1
R48	A1
R49	A1
R57	A1
R66	A4



Static Sensitive Devices
See Maintenance Section

COMPONENT NUMBER EXAMPLE

Component Number

A23 A2 R1234

Assembly Number — *Subassembly Number (if used)* — *Schematic Circuit Number*

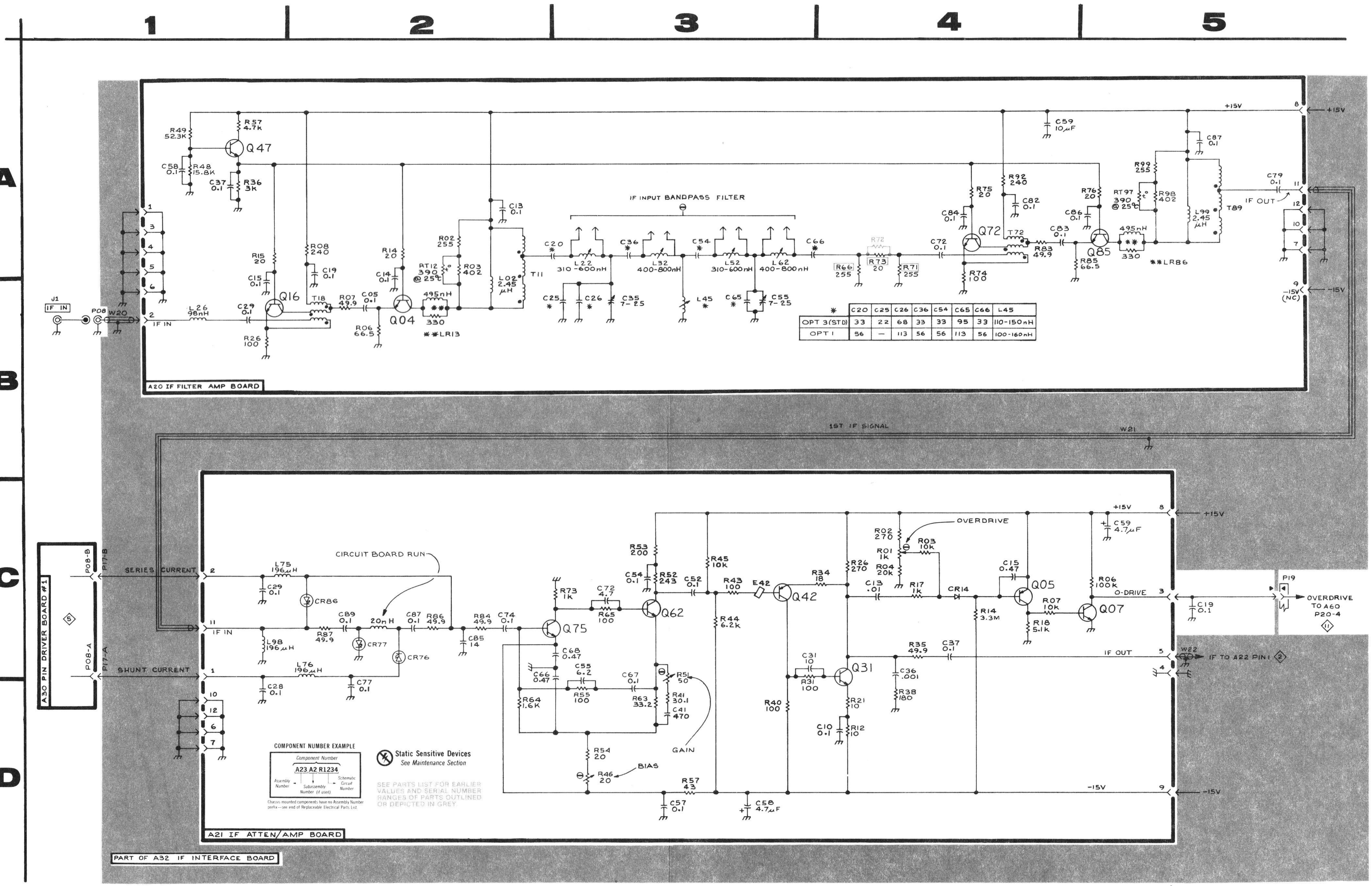
Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List

IF Input ⟨1⟩

Circuit Number	Schematic Location	Board Location
ASSY A20		
C05	B2	B2
C13	A2	B1
C14	A2	B1
C15	B1	B2
C19	A2	B2
C20	A2	B1
C25	B3	B2
C26	B3	B1
C29	B1	B2
C35	B3	C1
C36	A3	C2
C37	B1	C2
C54	A3	C2
C55	B3	D1
C58	A1	D2
C59	A4	D2
C65	B3	D2
C66	A3	D2
C72	A4	E1
C79	A5	E2
C82	A4	E1
C83	A4	E1
C84	A4	E2
C86	A5	E2
C87	A5	E2
L02	A2	A1
L22	A3	C1
L26	B1	C2
L32	A3	C1
L45	B3	C1
L52	A3	D1
L62	A3	D1
L99	A5	F2
LR13	B2	B1
LR86	A5	E2
Q04	B2	A1
Q16	B1	B2
Q47	A1	D2
Q72	A4	E1
Q85	A5	F2
R02	A2	A1
R03	A2	A1
R06	B2	A2
R07	B2	B2
R08	A2	A2
R14	A2	B1
R15	A1	B2
R26	B1	B2
R36	A1	C2
R48	A1	C2
R49	A1	C2
R57	A1	D2
R66	A4	D2
R71	A4	E1
R72	A4	E1
R73	A4	E1
R74	A4	E1
R75	A4	E1
R76	A5	E2
R83	A4	E1
R85	A4	F1
R92	A4	F1
R98	A5	F2
R99	A5	F2
RT12	A2	B1
RT97	A5	F2
T11	B2	B1
T18	B2	B2
T72	A4	E1
T89	A5	E2
ASSY A21		
C10	D4	B4
C13	C4	B4
C15	C4	B5
C28	D1	E6
C29	C1	E6
C31	C3	C4
C36	C4	C5
C37	C4	C5
C41	D3	F6
C52	C3	D4
C54	C3	D5
C55	D3	D5
C57	D3	D5
C58	D3	D6
C59	C5	D6
C66	D3	D5
C67	D3	D5
C68	C3	D5
C72	C3	E4
C74	C2	E5
C77	D2	E6
C85	C2	F5
C87	C2	E5
C89	C2	E6
CR14	C4	B5
CR76	C2	E5
CR77	C2	E5
CR86	C2	E5
E42	C3	C4
L75	C1	E5
L76	C2	E5
L98	C1	F6
Q05	C4	A5
Q07	C5	B5
Q31	C4	C4
Q42	C3	C4
Q62	C3	D4
Q75	C3	E5
R01	C4	A4
R02	C4	A4
R03	C4	A4
R04	C4	A4
R06	C5	A5
R07	C4	A5
R12	D4	B4
R14	C4	B5
R17	C4	B5
R18	C4	B5
R21	D4	B4
R26	C4	B5
R31	D3	C4
R34	C4	C5
R35	C4	C5
R38	D4	C5
R40	D3	C5
R41	D3	F6
R43	C3	D4
R44	C3	C5
R45	C3	C5
R46	D3	C5
R51	C3	D4
R52	C3	D4
R53	C3	D5
R54	D3	D5
R55	D3	D5
R57	D3	D5
R63	D3	D5
R64	D2	D5
R65	D3	D5
R73	C3	E5
R84	C2	E5
R86	C2	F5
R87	C2	E5
P/O ASSY A32		
C19	C5	H8
J1	B1	CHASSIS
P08	B1	I9

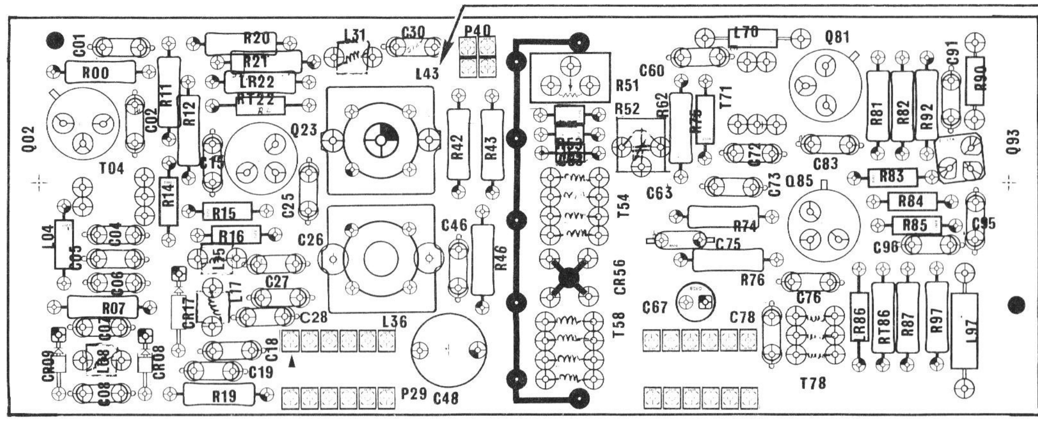
Component locations for A32 are shown on the reverse side of the block diagram.

2200-128

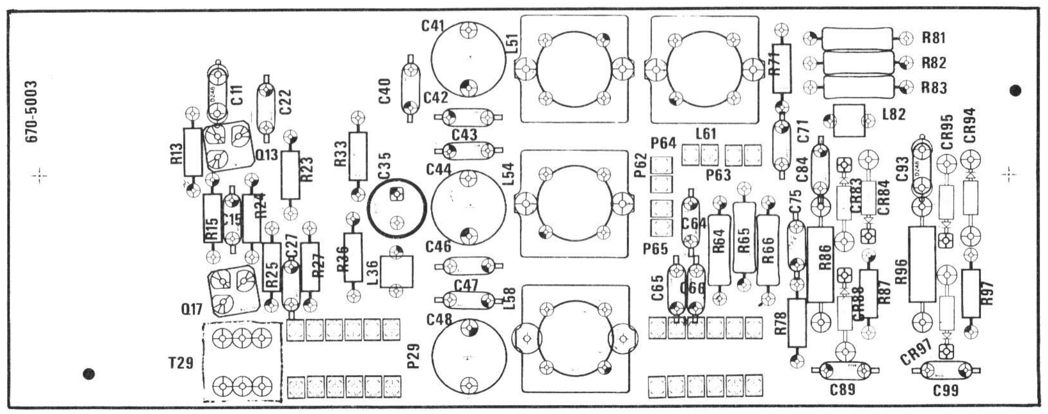


*	C20	C25	C26	C36	C54	C65	C66	L45
OPT 3 (STD)	33	22	68	33	33	95	33	110-150nH
OPT 1	56	—	113	56	56	113	56	100-160nH

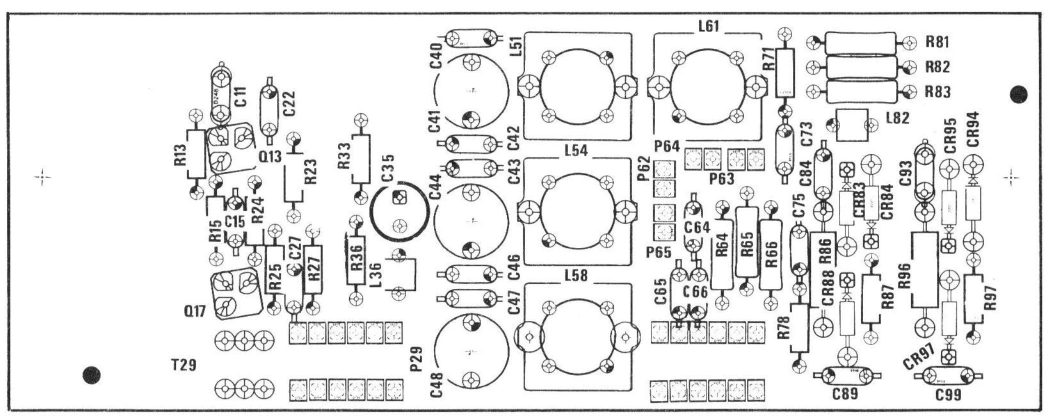
A	B	C	D	E	F	G



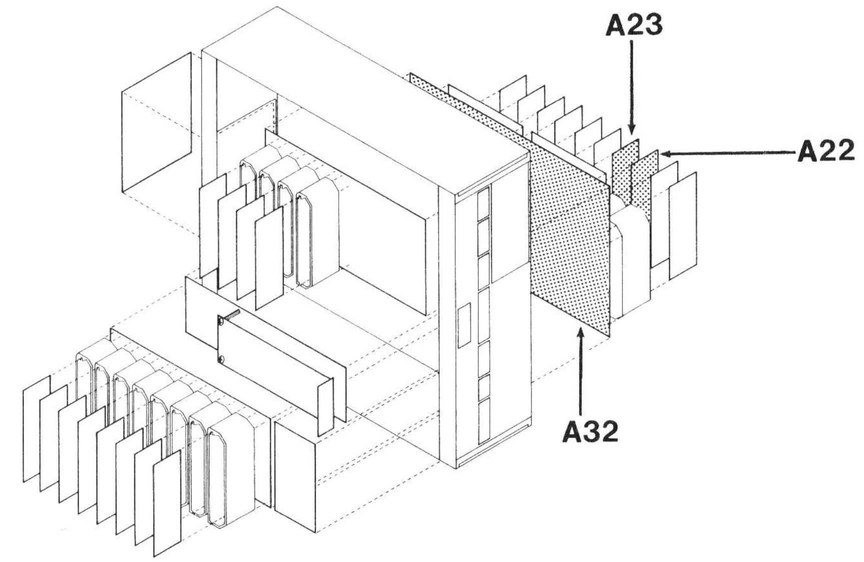
A22 IF ATTENUATOR-MIXER-FILTER BOARD
(SN B010120—UP OPT. 1 & 2)
(SN B010402—UP OPT. 3 STD.)



A23 IF SWITCH/AURAL DRIVE BOARD
(SN B010335 & UP OPT. 1 & 2)
(SN B010402 & UP OPT. 3 STD.)

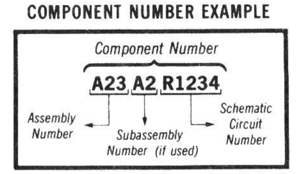


A23 IF SWITCH/AURAL DRIVE BOARD
(SN B010120—B010334 OPT. 1 & 2)



Static Sensitive Devices
See Maintenance Section

COMPONENT NUMBER EXAMPLE



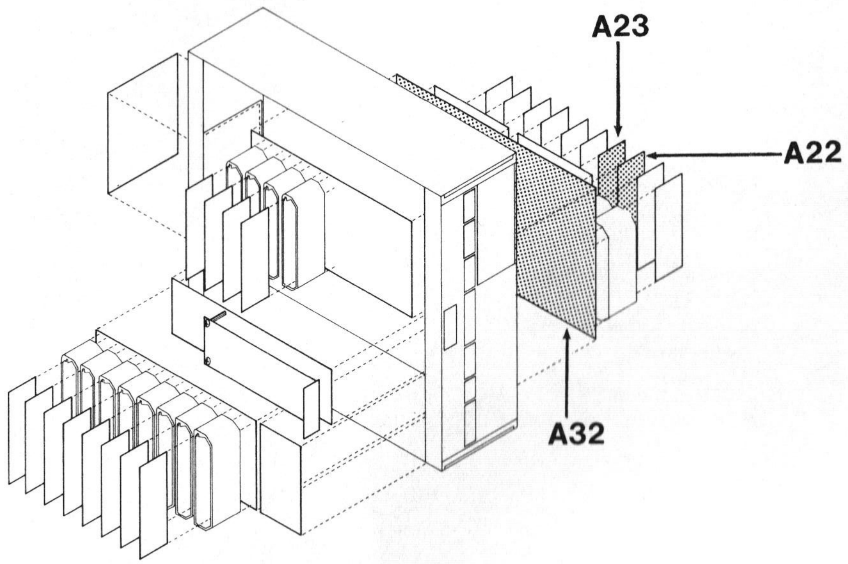
Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

Circuit Number	Schematic Location
ASSY A22	
C01	B2
C02	A2
C04	A2
C05	A1
C06	A1
C07	A1
C08	B1
C15	A2
C18	A1
C19	A1
C25	B3
C26	A2
C27	A1
C28	B1
C30	B3
C46	B3
C48	B3
C53	A4
C60	B4
C63	B4
C67	B5
C72	A4
C73	B4
C75	B4
C76	A4
C78	A5
C83	A4
C91	B3
C95	A1
C96	A2
CR08	B1
CR09	B1
CR17	A1
CR56	B3
L04	A2
L08	B1
L15	A1
L17	A1
L31	A3
L33*	A3
L36	A3
L43	A3
L70	B4
L97	A5
LR22	A2
LR86	B5
Q02	A2
Q23	A2
Q81	B4
Q85	B4
Q93	A2
R00	A2
R07	B2
R11	A2
R12	A2
R14	A2
R15	A2
R16	A2
R19	A1
R20	A2
R21	A2
R42	A3
R43	A3
R46	A3
R51	B3
R52	B3

@

G

L33 (SN B010121—B010307 OPT. 1 & 2 ONLY)



Static Sensitive Devices
See Maintenance Section

COMPONENT NUMBER EXAMPLE

Component Number
A23 A2 R1234
Assembly Number — *Subassembly Number (if used)* — *Schematic Circuit Number*

Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

IF Mixer & Aural Drive ⟨2⟩

Circuit Number	Schematic Location	Board Location
ASSY A22		
C01	B2	A1
C02	A2	A1
C04	A2	A2
C05	A1	A2
C06	A1	A2
C07	A1	A2
C08	B1	A3
C15	A2	B1
C18	A1	B2
C19	A1	B3
C25	B3	B2
C26	A2	B2
C27	A1	B2
C28	B1	B2
C30	B3	C1
C46	B3	C2
C48	B3	C3
C53	A4	D1
C60	B4	D1
C63	B4	D2
C67	B5	D2
C72	A4	E1
C73	B4	E2
C75	B4	D2
C76	A4	E2
C78	A5	E2
C83	A4	E1
C91	B3	F1
C95	A1	F2
C96	A2	E2
CR08	B1	A3
CR09	B1	A3
CR17	A1	B2
CR56	B3	D2
L04	A2	A2
L08	B1	A3
L15	A1	B2
L17	A1	B2
L31	A3	B1
L33*	A3	G1
L36	A3	C2
L43	A3	C1
L70	B4	E1
L97	A5	F2
LR22	A2	B1
LR86	B5	E2
Q02	A2	A1
Q23	A2	B1
Q81	B4	E1
Q85	B4	E2
Q93	A2	F1
R00	A2	A1
R07	B2	A2
R11	A2	B1
R12	A2	B1
R14	A2	B2
R15	A2	B2
R16	A2	B2
R19	A1	B3
R20	A2	B1
R21	A2	B1
R42	A3	C1
R43	A3	C1
R46	A3	C2
R51	B3	D1
R52	B3	D1

Circuit Number	Schematic Location	Board Location
R53	B3	D1
R62	B4	D1
R74	B4	E2
R75	A4	D1
R76	B4	E2
R81	B4	E1
R82	A1	E1
R83	A4	E2
R84	A2	E2
R85	A4	E2
R87	A5	E2
R90	A2	F1
R92	A1	E1
R97	A5	F2
RT22	A2	B1
RT86	A4	E2
T04	A2	A2
T54	B3	D2
T58	B3	D2
T71	B4	D1
T78	A5	E3
ASSY A23		
C11	D4	B4,B7
C15	D5	B5,B8
C22	D4	B4,B7
C27	D4	B5,B8
C35	D5	C5,C8
C40	C3	C4,C7
C41	C3	C4,C7
C42	C3	C4,C8
C43	C3	C4,C8
C44	C3	C5,C8
C46	C3	C5,C8
C47	C3	C5,C8
C48	C3	C5,C9
C64	C3	D5,D8
C65	C2	D5,D8
C66	D5	D5,D8
C71	C4	E4
C73*	C4	E8
C75	C5	E5,E8
C84	C4	E5,E8
C89	C5	E6,E9
C93	C4	E5,E8
C99	C5	F6,F9
CR83	C5	E5,E8
CR84	C4	E5,E8
CR88	C5	E5,E8
CR94	C4	F5,F8
CR95	C5	F5,F8
CR97	C5	E6,E9
L36	D5	C5,C8
L51	C3	C4,C7
L54	C3	C5,D8
L58	C3	C5,D8
L61	C4	D4,D7
L82	C4	E4,E8
P62	C3	D5,D8
P63	C4	D5,D8
P64	C3	D5,D8
P65	C3	D5,D8
Q13	D4	B5,B8
Q17	D5	B5,B8

Circuit Number	Schematic Location	Board Location
R13	D4	B5,B8
R15	D5	B5,B8
R23	D4	B5,B8
R24	D5	B5,B8
R25	D5	B5,B8
R27	D4	B5,B8
R33	D5	B5,B8
R36	C5	B5,B8
R64	C2	D5,D8
R65	C2	D5,D8
R66	C2	E5,E8
R71	D4	E4,E7
R78	C5	E5,E9
R81	C4	E4,E7
R82	C4	E4,E7
R83	C4	E4,E7
R86	C5	E5,E8
R87	C5	E5,E8
R96	C5	E5,E8
R97	C5	F5,F8
T29	D5	B6,B9
P/O ASSY A32		
C23	C2	L6
C24	D5	L6
C29	C5	H7
P29	B1	H7
P39	D5	H6

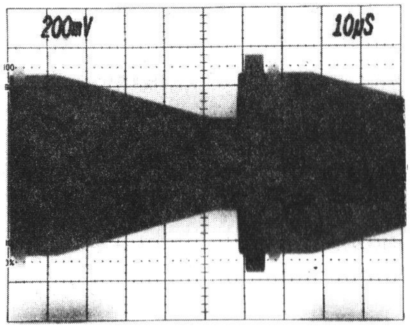
Component locations for A32 are shown on the reverse side of the block diagram.

* Note applicable serial number ranges for earlier board versions.

2200-129

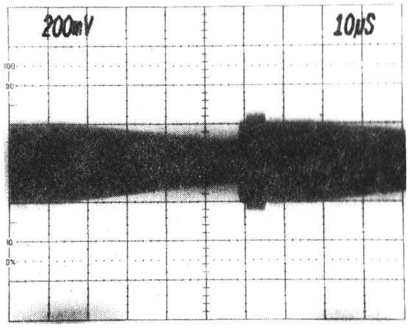
2

1



0 V

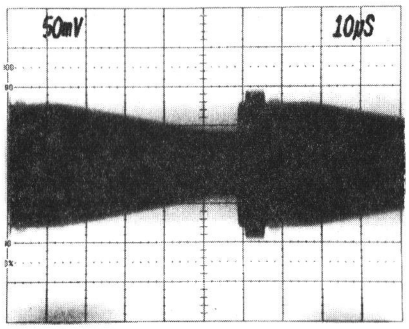
2



0 V

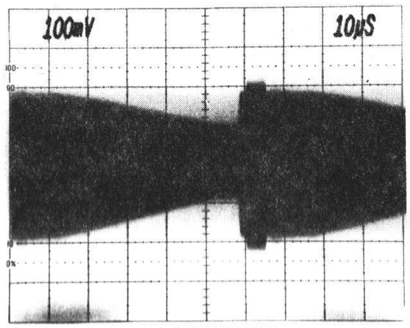
SOUND TRAP OUT

3



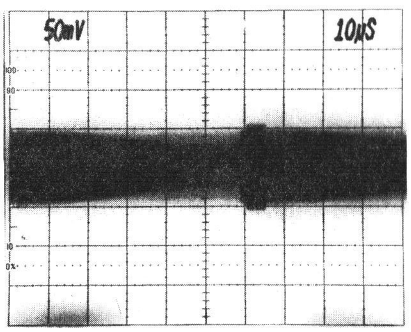
0 V

4



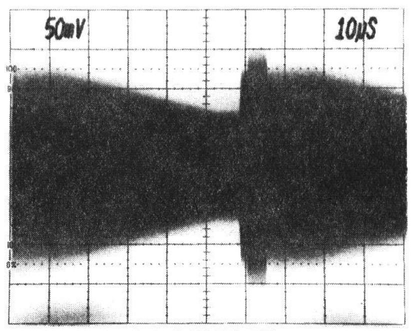
AC COUPLED

5



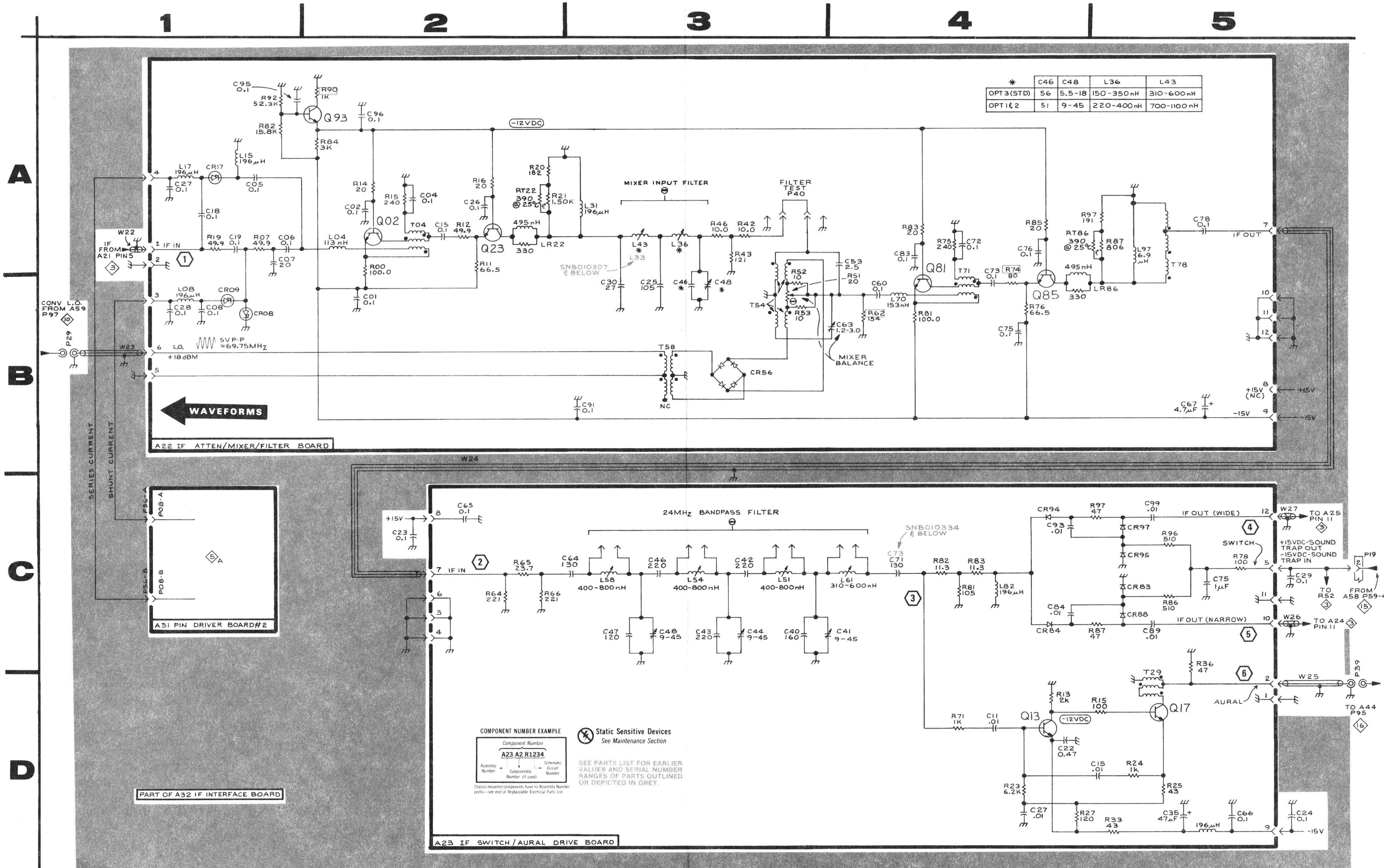
AC COUPLED

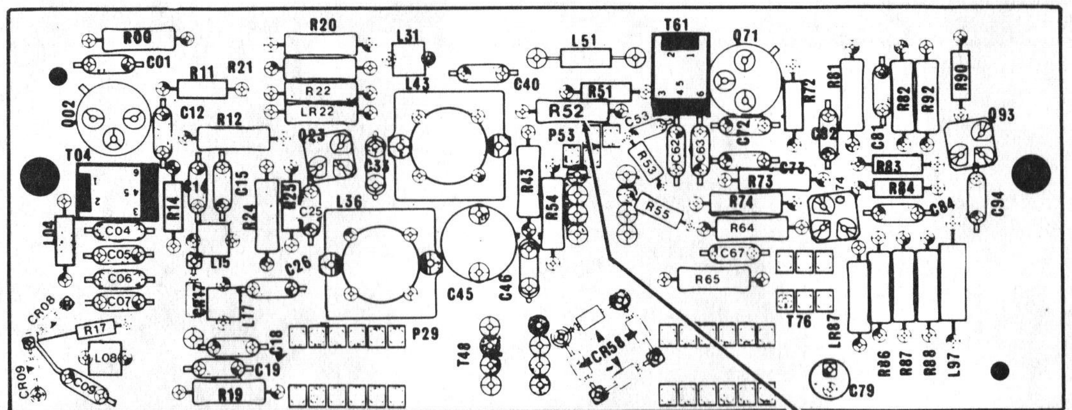
6



0 V

DC COUPLED

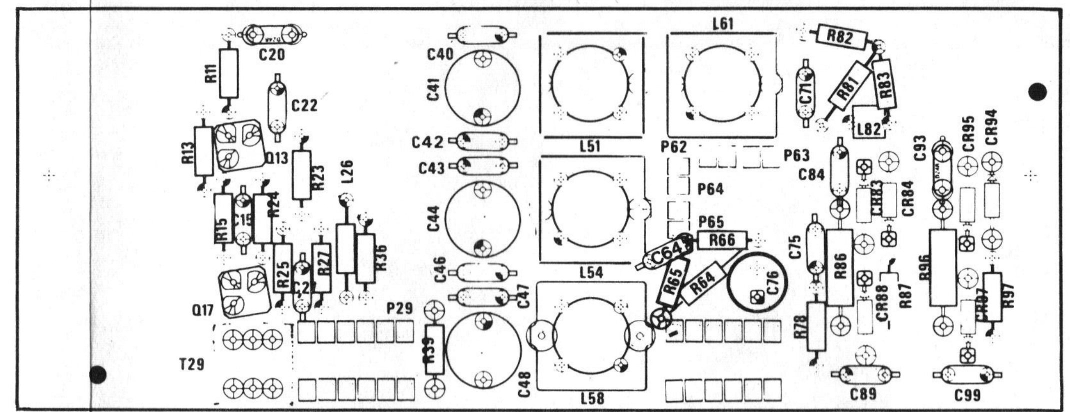

1
2
3
4
5
A
B
C
D
A22 IF ATTEN/MIXER/FILTER BOARD
MIXER INPUT FILTER
FILTER TEST P40
MIXER BALANCE
WAVEFORMS
IF OUT
IF FROM A21 PINS
CONV L.O. FROM A59 P97
5V P-P ≈69.75MHz
+18dBM
-12VDC
+15V
-15V
SERIES CURRENT
SHUNT CURRENT
A31 PIN DRIVER BOARD#2
PART OF A32 IF INTERFACE BOARD
A23 IF SWITCH/AURAL DRIVE BOARD
24MHz BANDPASS FILTER
IF IN
IF OUT (WIDE)
IF OUT (NARROW)
SWITCH
+15VDC-SOUND TRAP OUT
-15VDC-SOUND TRAP IN
TO A25 PIN 11
TO A24 PIN 11
TO R52
FROM A58 P59-4
AURAL
TO A44 P95
SNB010307 & BELOW
SNB010334 & BELOW
COMPONENT NUMBER EXAMPLE
A23 A2 R1234
Static Sensitive Devices
See Maintenance Section
SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES OF PARTS OUTLINED OR DEPICTED IN GREY.
* | C46 | C48 | L36 | L43
OPT 3(STD) | 56 | 5.5-18 | 150-350nH | 310-600nH
OPT 1&2 | 51 | 9-45 | 220-400nH | 700-1100nH



A22 IF ATTENUATOR-MIXER-FILTER BOARD
(SN B000100—B000119 OPT. 1 & 2)
(SN B000100—B010401 OPT. 3 STD.)

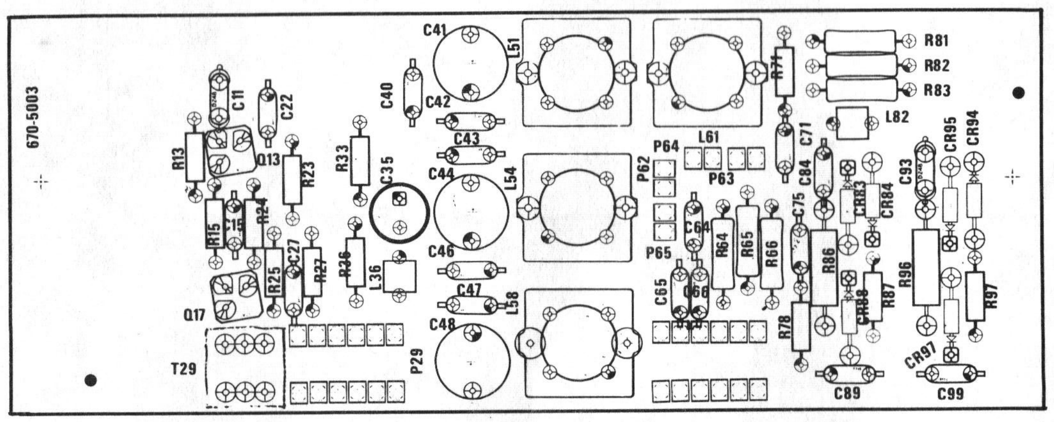
R53
B010120 & UP

C08, C09
(On back of board)

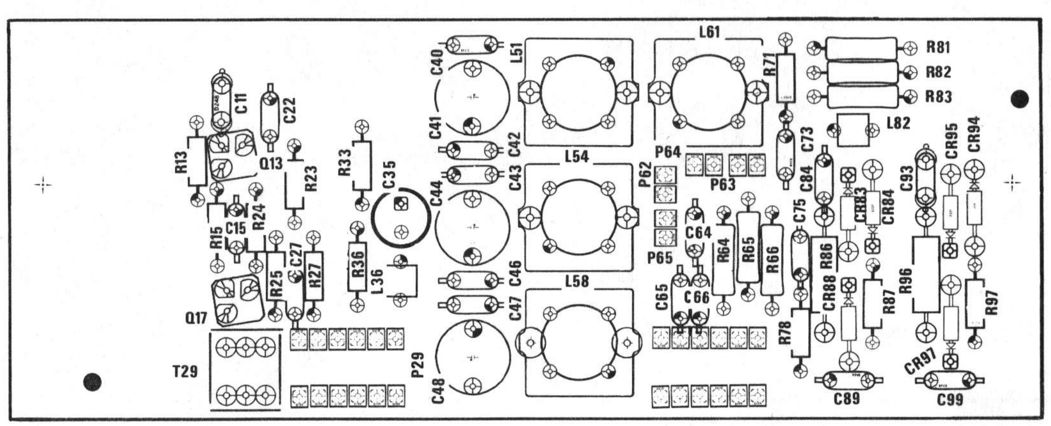


A23 IF SWITCH/AURAL DRIVE BOARD
(SN B000100—B000119 OPT. 1 & 2)
(SN B000100—B000119 OPT. 3 STD.)

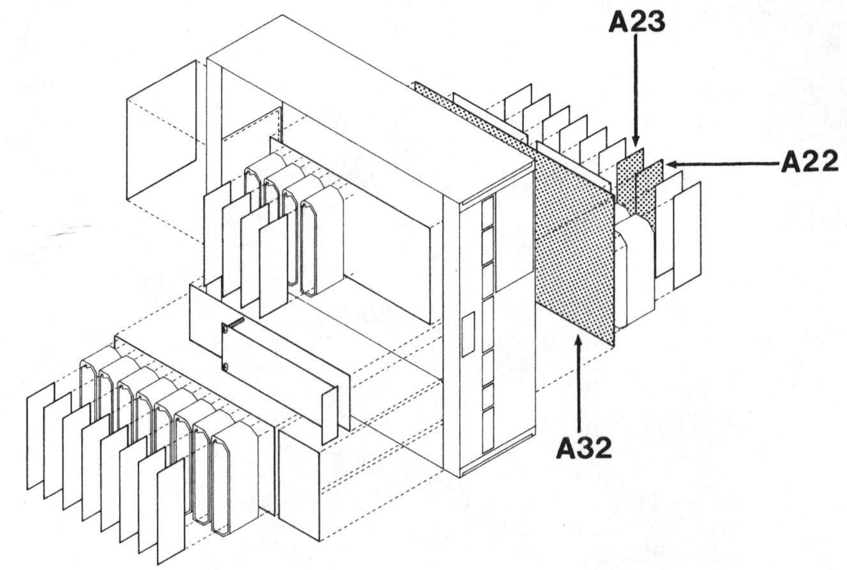
C65
C66
(On back of board)



A23 IF SWITCH/AURAL DRIVE BOARD
(SN B010335—B010401 OPT. 3 STD.)



A23 IF SWITCH/AURAL DRIVE BOARD
(SN B010120—B010334 OPT. 3 STD.)



Static Sensitive Devices
See Maintenance Section

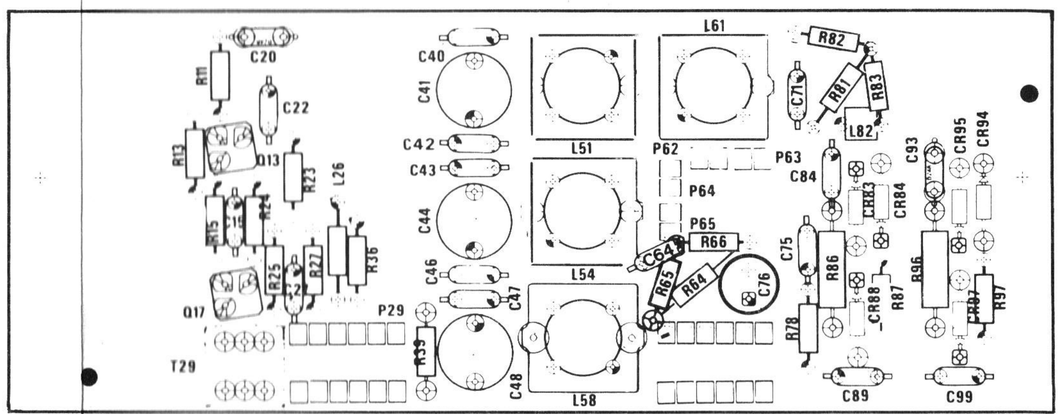
COMPONENT NUMBER EXAMPLE

Component Number: A23 A2 R1234 — Assembly Number; Subassembly Number (if used); Schematic Circuit Number

Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

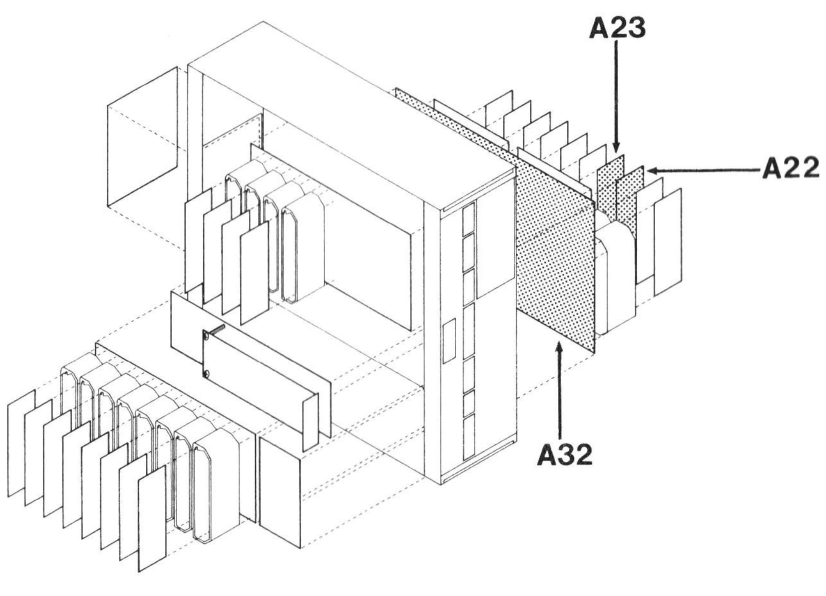
Circuit Number	Schematic Location
ASSY A22	
C01	B2
C04	A2
C05	A1
C06	A1
C07	A1
C08	B1
C09	A1
C12	A2
C14	A2
C15	B2
C18	A1
C19	B1
C25	A2
C26	A1
C33	B3
C40	B3
C45	B3
C46	B3
C53	B4
C62	A4
C63	A4
C67	A5
C72	A4
C73	B4
C79	B3
C81	B3
C82	B4
C84	A4
C94	A2
CR08	B1
CR09	B1
CR17	A1
CR58	B2
L04	A2
L08	B1
L15	A1
L17	A1
L31	A3
L36	A3
L43	A3
L61	B4
L97	A5
LR22	A2
LR87	B5
P53	A3
Q02	A2
Q23	A2
Q71	B4
Q74	B4
Q93	A2
R00	A2
R11	A2
R12	A2
R14	A2
R17	A1
R19	A1
R20	A2
R21	A2
R24	A2
R25	A2
R43	A3
R51	A4
R52*	A3
R53	A3
R53*	B4
R54	A3
R55*	B4

G	H	I	J	K	L



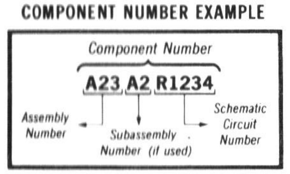
A23 IF SWITCH/AURAL DRIVE BOARD
(SN B000100—B000119 OPT. 1 & 2)
(SN B000100—B000119 OPT. 3 STD.)

C65
C66
(On back of board)



Static Sensitive Devices
See Maintenance Section

COMPONENT NUMBER EXAMPLE



Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

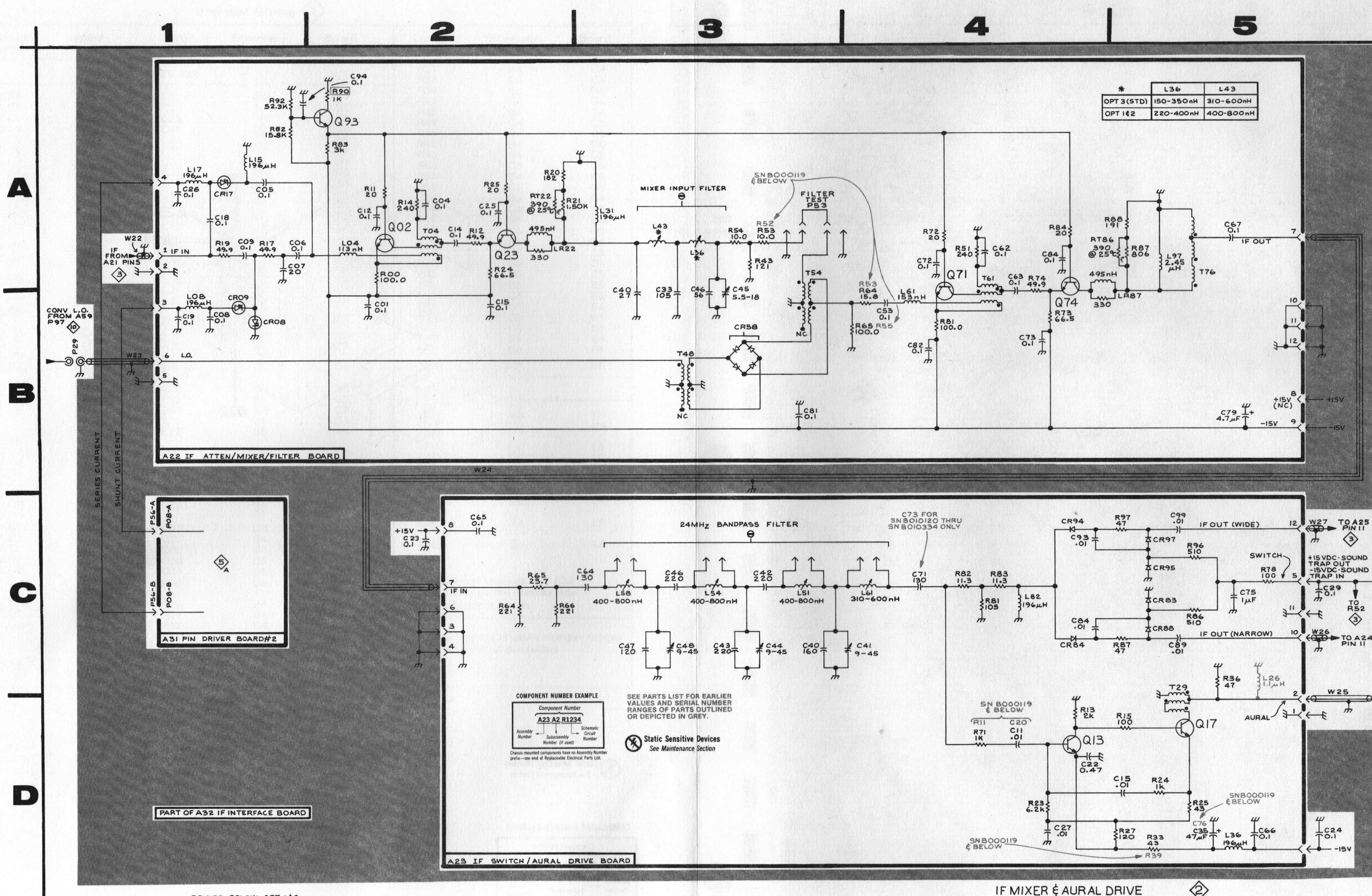
IF Mixer & Aural Drive ⟨2⟩

Circuit Number	Schematic Location	Board Location
ASSY A22		
C01	B2	A1
C04	A2	A2
C05	A1	A2
C06	A1	A2
C07	A1	A2
C08	B1	D4
C09	A1	A3
C12	A2	B1
C14	A2	B2
C15	B2	B2
C18	A1	B2
C19	B1	D4
C25	A2	B2
C26	A1	B2
C33	B3	C3
C40	B3	C1
C45	B3	C2
C46	B3	C2
C53	B4	D1
C62	A4	D1
C63	A4	D1
C67	A5	D2
C72	A4	D1
C73	B4	E2
C79	B3	E3
C81	B3	E1
C82	B4	E1
C84	A4	E2
C94	A2	F2
CR08	B1	A2
CR09	B1	A3
CR17	A1	B2
CR58	B2	D3
L04	A2	A2
L08	B1	A3
L15	A1	B2
L17	A1	B2
L31	A3	C1
L36	A3	B2
L43	A3	C1
L61	B4	D1
L97	A5	F2
LR22	A2	B1
LR87	B5	E2
P53	A3	D1
Q02	A2	A1
Q23	A2	B1
Q71	B4	E1
Q74	B4	E2
Q93	A2	F1
R00	A2	A1
R11	A2	B1
R12	A2	B1
R14	A2	B2
R17	A1	A2
R19	A1	B3
R20	A2	B1
R21	A2	B1
R24	A2	B2
R25	A2	B2
R43	A3	C2
R51	A4	D1
R52*	A3	D1
R53	A3	E3
R53*	B4	D1
R54	A3	D2
R55*	B4	D2
R64	B4	E2
R65	B4	D2
R72	A4	E1
R73	B4	E2
R74	B4	E2
R81	B4	E1
R82	A1	E1
R83	A2	E2
R84	A4	E2
R87	A5	E2
R88	A5	E2
R90	A2	F1
R92	A1	E1
RT22	A2	B1
RT86	A4	E2
T04	A2	A2
T48	B3	C3
T54	A3	D2
T61	B4	D1
T76	A5	E2
ASSY A23		
C11	D4	B4,B8
C15	D5	B5,B8,H2
C20*	D4	H1
C22	D4	B4,B8,H1
C27	D4	B5,B8,H2
C35	D5	C5,C8
C40	C3	C4,C7,I1
C41	C4	C4,C8,I1
C42	C3	C4,C8,I2
C43	C3	C5,C8,I2
C44	C3	C5,C8,I2
C46	C3	C5,C8,I2
C47	C3	C5,C9,I2
C48	C3	C6,C9,I3
C64	C3	D5,D8,J2
C65	C2	D5,E9,J2
C66	D5	D5,E9,K2
C71	C4	E5,K1
C73*	C4	E8
C75	C5	E5,E8,K2
C76*	D5	K2
C84	C4	E5,E8,K2
C89	C5	E6,E9,K3
C93	C4	E5,E8,L2
C99	C5	F6,F9,K3
CR83	C5	E5,E8,K2
CR84	C4	E5,E8,K2
CR88	C5	E5,E9,K2
CR94	C4	F5,F8,L2
CR95	C5	F5,F8,L2
CR97	C5	F6,F9,L2
L26*	C5	I2
L36	D5	C5,C8
L51	C3	C4,C7,J1
L54	C3	D5,D8,J2
L58	C3	D5,D9,J3
L61	C4	D4,D7,K1
L82	C4	E4,E8,K1
P62	C3	D5,D8,J2
P63	C4	E5,E8,K2
P64	C3	D5,D8,K2
P65	C3	D5,D8,J2
Q13	D4	B5,B8,H2
Q17	D5	B5,B9,H2
R11*	D4	H1
R13	D4	B5,B8,H2
R15	D5	B5,B8,H2
R23	D4	B5,B8,H2
R24	D5	B5,B8,H2
R25	D5	B5,B8,H2
R27	D5	B5,B8,H2
R33	D5	C5,C8
R36	C5	C5,C8,I2
R39*	D5	I3
R64	C2	D5,E8,J2
R65	C2	E5,E8,J2
R66	C2	E5,E8,K2
R71	D4	E4,E7
R78	C5	E6,E9,K2
R81	C4	E4,E7,K1
R82	C4	E4,E7,K1
R83	C4	E4,E7,K1
R86	C5	E5,E8,K2
R87	C5	E5,E9,K2
R96	C5	E5,E8,L2
R97	C5	F5,F9,L2
T29	D5	B6,B9,H3
P/O ASSY A32		
C23	C2	L7
C24	D5	L7
C29	C5	H7
P29	B1	H7
P39	C5	H6

Component locations for A32 are shown on the reverse side of the block diagram.

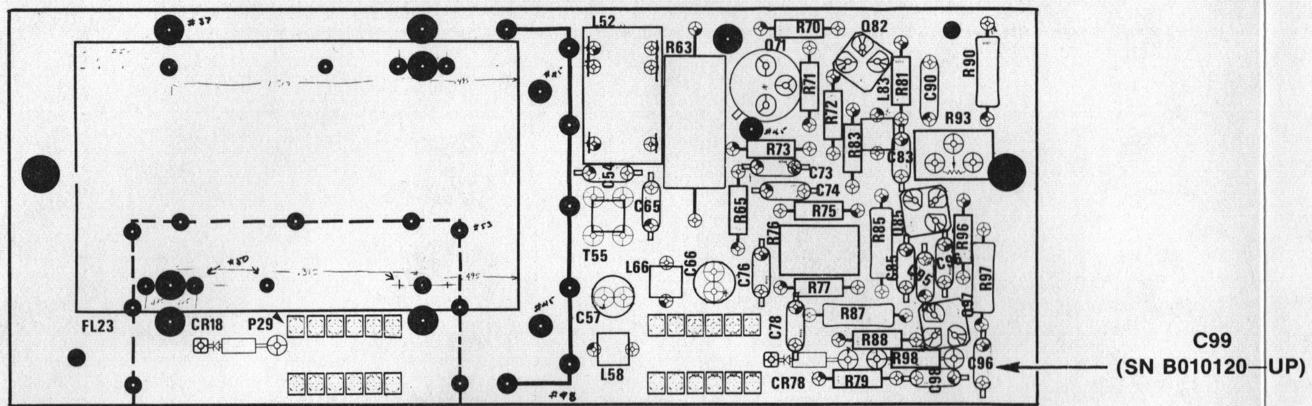
*** Note applicable serial number ranges for earlier board versions.**

2200-130

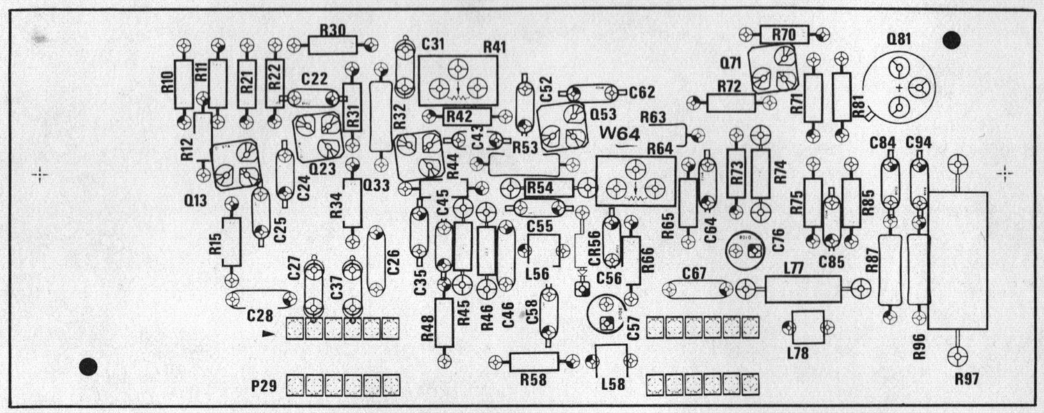


IF MIXER & AURAL DRIVE

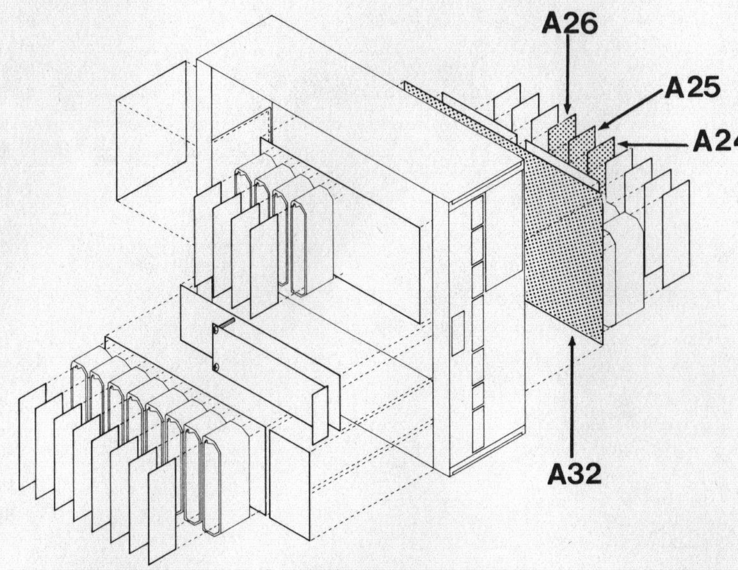
IF MIXER & AURAL DRIVE A22, A23 B000100-B000119 ⟨2⟩



A24 IF SAW AMPLIFIER (NARROW BAND) BOARD
A25 IF SAW AMPLIFIER (WIDE BAND) BOARD



A26 IF POST AMPLIFIER BOARD



Static Sensitive Devices
See Maintenance Section

COMPONENT NUMBER EXAMPLE

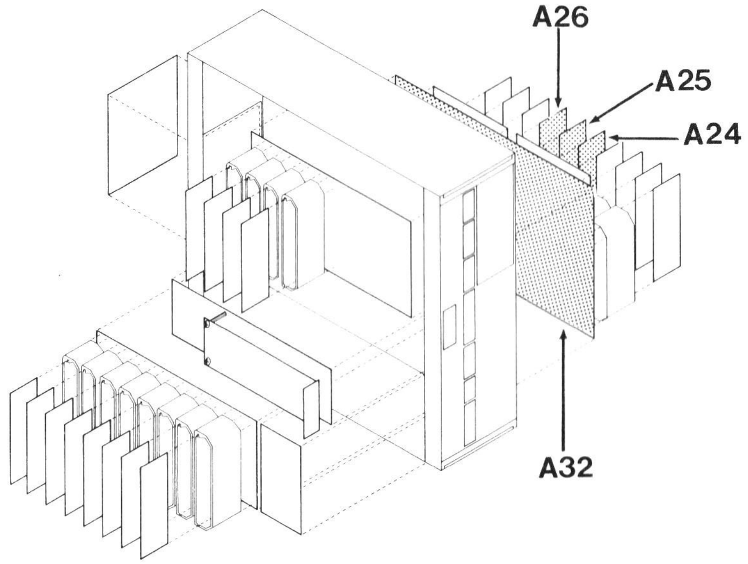
Component Number: A23 A2 R1234 — Assembly Number (A23), Subassembly Number (if used) (A2), Schematic Circuit Number (R1234)

Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

Circuit Number	Schematic Location
ASSY A24, 25	
C54	A3,B3
C57	A2,B2
C65	A2,C2
C66	B3,C3
C73	B2,C2
C74	B2,C2
C76	B1,C1
C78	A1,C1
C83	A2,C2
C85	B1,C1
C90	A2,B2
C95	B1,C1
C96	A1,C1
C96*	B1,C1
C98	A1,C1
C99	B1,C1
CR18	A3,C3
CR78	B1,C1
FL23	A3,B3
L52	A3,C3
L58	A3,B3
L66	B3,C3
L83	A1,B1
Q71	B2,C2
Q82	A2,C2
Q85	A2,C2
Q97	B1,C1
R63	A2,B2
R65	B2,C2
R70	A2,C2
R71	B2,C2
R72	B2,C2
R73	B2,C2
R75	A2,C2
R76	B1,C1
R77	B1,C1
R79	A1,C1
R81	A2,C2
R83	A2,B2
R85	B2,C2
R87	A1,C1
R88	B1,C1
R90	A2,B2
R93	B2,C1
R96	A1,C1
R97	B1,C1
R98	A1,C1
T55	A2,C2

G

C99
(SN B010120—UP)



Static Sensitive Devices
See Maintenance Section

COMPONENT NUMBER EXAMPLE

Component Number
A23 A2 R1234
Assembly Number — *Subassembly Number (if used)* — *Schematic Circuit Number*

Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

IF Nyquist Filtering ⟨3⟩

Circuit Number	Schematic Location	Board Location
ASSY A24, 25		
C54	A3,B3	D2
C57	A2,B2	D2
C65	A2,C2	D2
C66	B3,C3	D2
C73	B2,C2	E2
C74	B2,C2	E2
C76	B1,C1	E2
C78	A1,C1	E2
C83	A2,C2	E1
C85	B1,C1	E2
C90	A2,B2	F1
C95	B1,C1	F2
C96	A1,C1	F2
C96*	B1,C1	F3
C98	A1,C1	F3
C99	B1,C1	G3
CR18	A3,C3	B2
CR78	B1,C1	E3
FL23	A3,B3	A2
L52	A3,C3	D1
L58	A3,B3	D3
L66	B3,C3	D2
L83	A1,B1	E1
Q71	B2,C2	E1
Q82	A2,C2	E1
Q85	A2,C2	E2
Q97	B1,C1	F2
R63	A2,B2	D1
R65	B2,C2	E2
R70	A2,C2	E1
R71	B2,C2	E1
R72	B2,C2	E1
R73	B2,C2	E1
R75	A2,C2	E2
R76	B1,C1	E2
R77	B1,C1	E2
R79	A1,C1	E3
R81	A2,C2	E1
R83	A2,B2	E1
R85	B2,C2	E2
R87	A1,C1	E2
R88	B1,C1	E2
R90	A2,B2	F1
R93	B2,C1	F1
R96	A1,C1	F2
R97	B1,C1	F2
R98	A1,C1	E3
T55	A2,C2	D2

Circuit Number	Schematic Location	Board Location
ASSY A26		
C22	B4	B4
C24	B4	B5
C25	B4	B5
C26	B3	C5
C27	C3	B5
C28	B3	B5
C31	C4	C4
C35	B4	C5
C37	B3	B5
C43	C4	C5
C45	B4	C5
C46	B4	C5
C52	C5	C4
C55	C5	C5
C56	C4	D5
C57	C5	D5
C58	C5	C5
C62	B5	D4
C64	B4	D5
C67	B5	D5
C76	B5	E5
C84	C5	E5
C85	C5	E5
C94	B5	E5
CR56	C5	D5
E13	B4	B5
E23	B4	B5
E33	B4	C5
E71	B5	E4
E71*	B5	E4
L56	C5	C5
L58	C5	D6
L77	B5	E5
L78	B5	E6
LR81	B5	E4
Q13	C4	B5
Q23	B4	B5
Q33	B4	C5
Q53	B5	D4
Q71	B5	E4
Q81	B5	E4
R10	B4	B4
R11	B4	B4
R12	C4	B5
R15	B3	B5
R21	B4	B4
R22	B4	B4
R30	B4	B4

Circuit Number	Schematic Location	Board Location
R31	B4	C4
R32	C4	C4
R34	B3	B5
R41	C4	C4
R42	B4	C4
R44	C4	C5
R45	B4	C5
R46	B4	C5
R48	B4	C5
R53	C5	C5
R54	C4	C5
R58	C5	C6
R63	B5	D4
R64*	C4	D5
R65	B5	D5
R66	C5	D5
R70	B5	E4
R71	B5	E4
R72	B5	D4
R73	B5	E5
R74	B5	E5
R75	C5	E5
R81*	B5	E4
R85	B5	E5
R87	B5	E5
R96	B5	E5
R97	B5	F6
W64*	C4	D5
P/O ASSY A32		
C59	D5	H4
C69	C5	H4
L41	D2	L6
L42	D2	L6
P59	D5	H4
P69	C5	H4
P93	B5	L1
Q52	C1	L5
R52	C1	L5

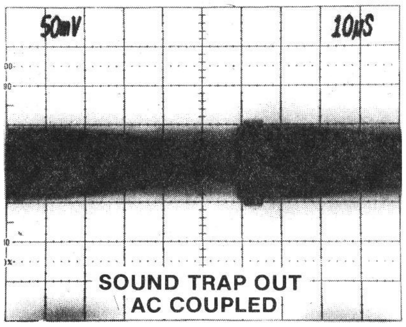
Component locations for A32 are shown on the reverse side of the block diagram.

*** Note applicable serial number ranges for earlier board versions.**

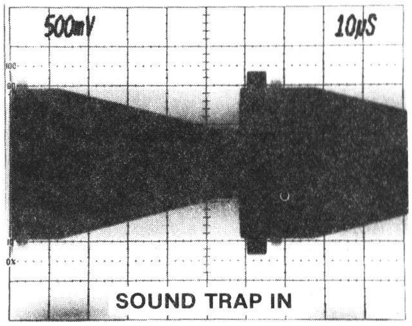
REV JUN 1984

⟨3⟩

⟨1⟩

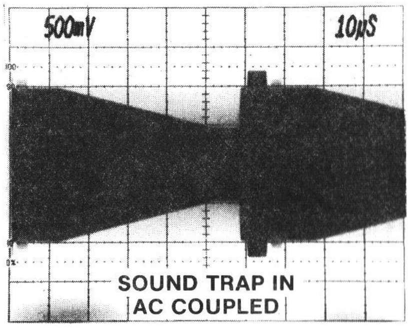


⟨2⟩

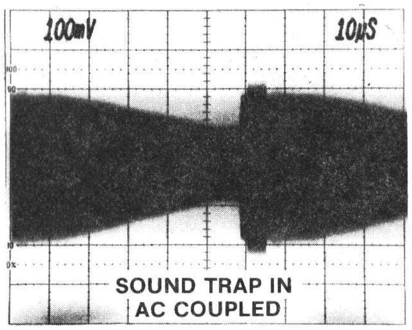


0 V

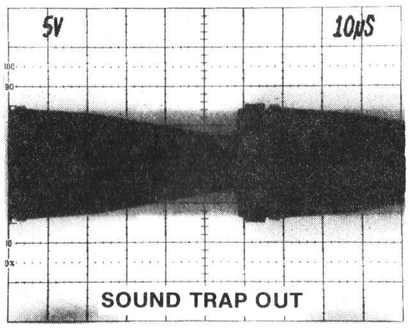
⟨3⟩



⟨4⟩

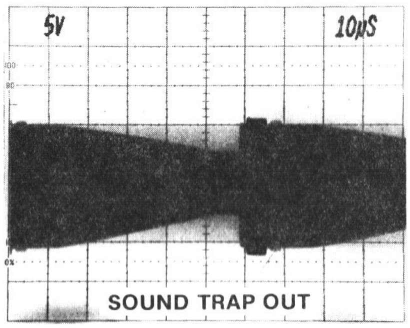


⟨5⟩



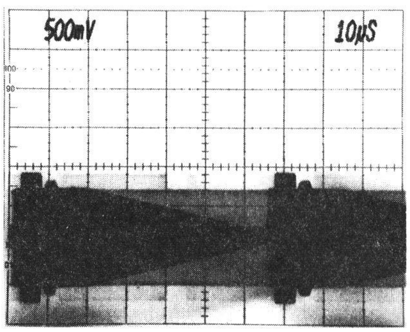
0 V

⟨6⟩



0 V

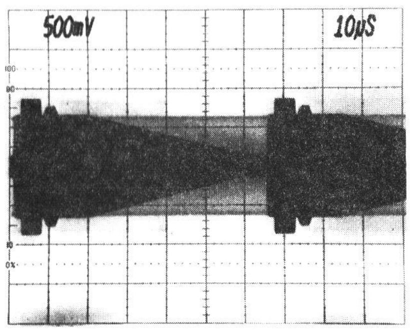
⟨7⟩



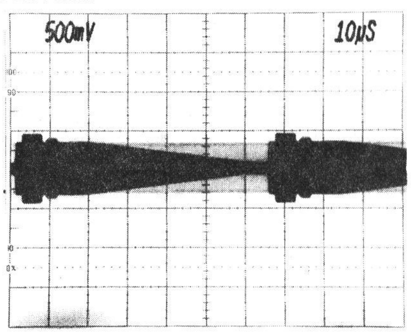
0 V

DC LEVEL DEPENDS ON R64 SETTING

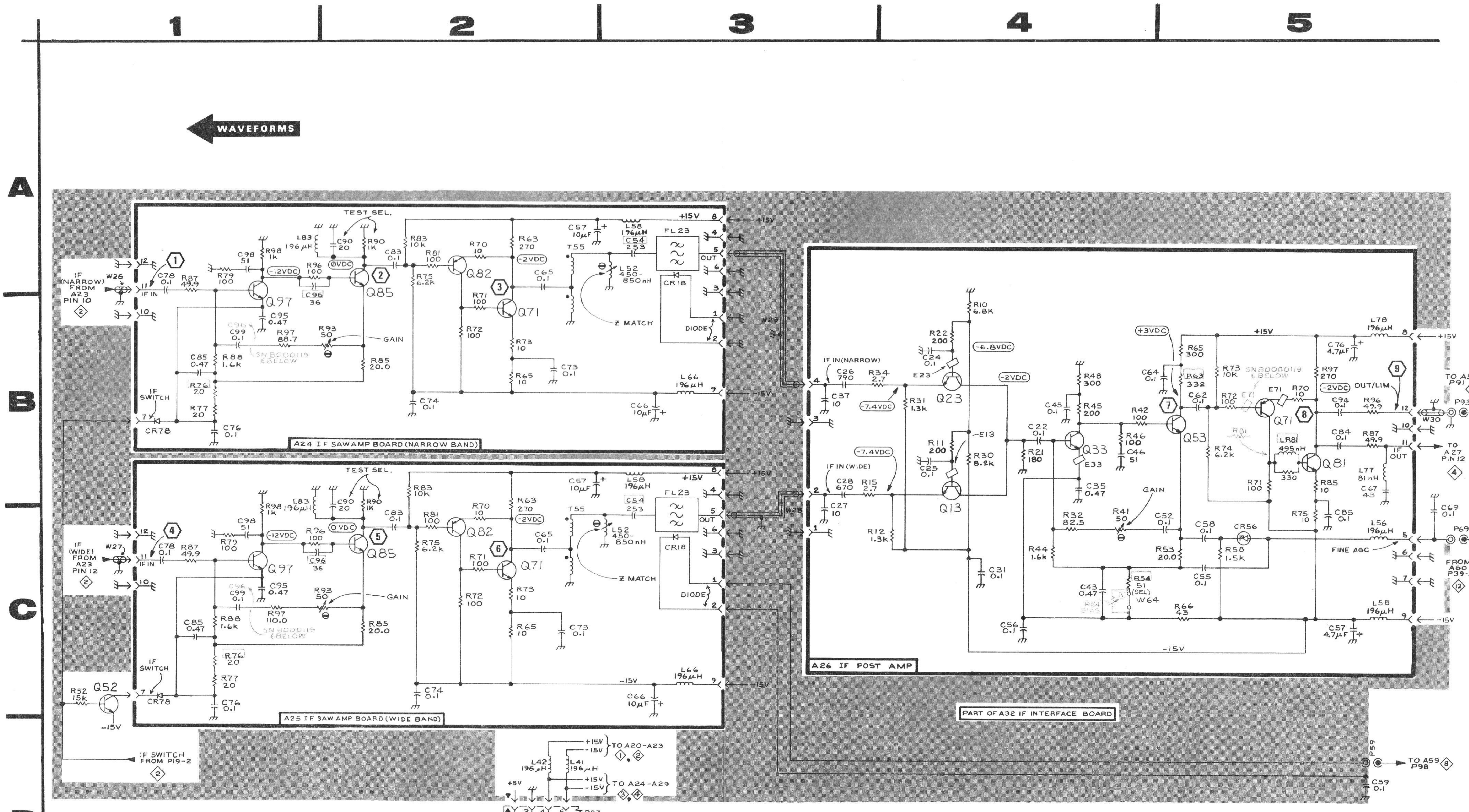
⟨8⟩



⟨9⟩



0 V



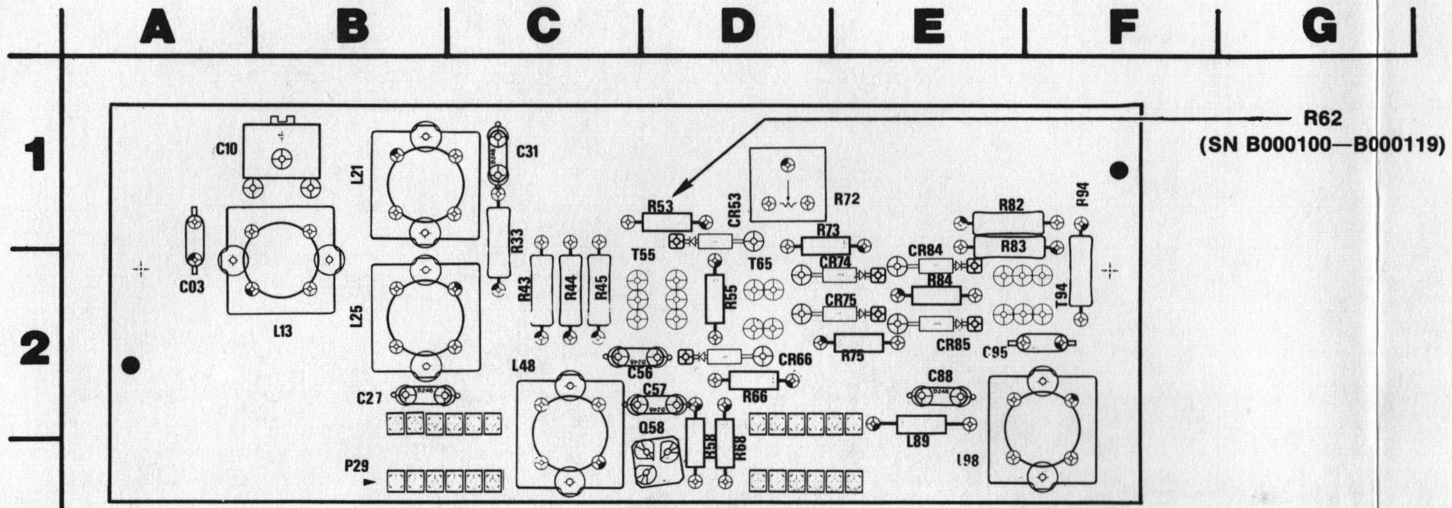
SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES OF PARTS OUTLINED OR DEPICTED IN GREY.

Static Sensitive Devices
See Maintenance Section

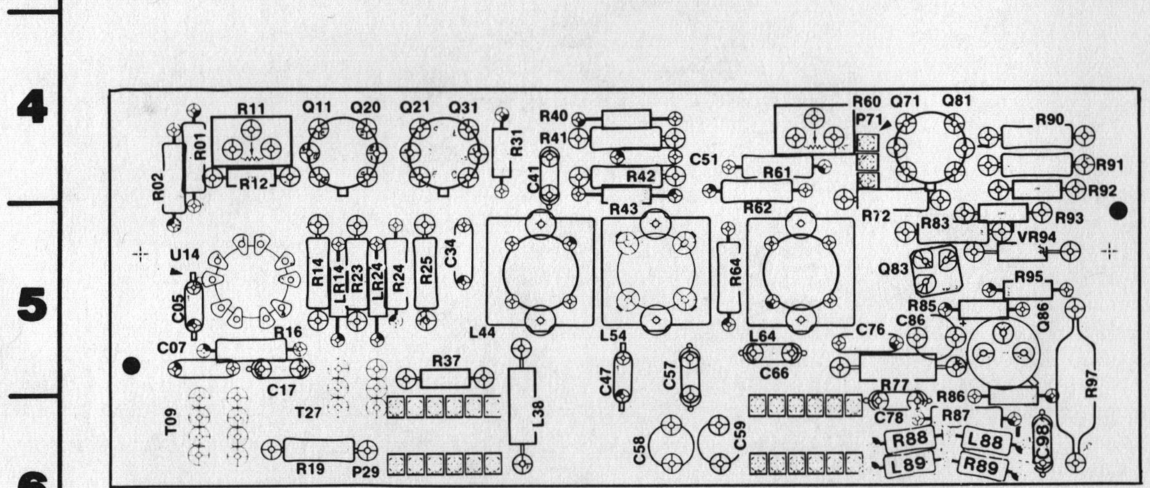
COMPONENT NUMBER EXAMPLE

Component Number: A23 A2 R1234 — Assembly Number, Subassembly Number (if used), Schematic Circuit Number

Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

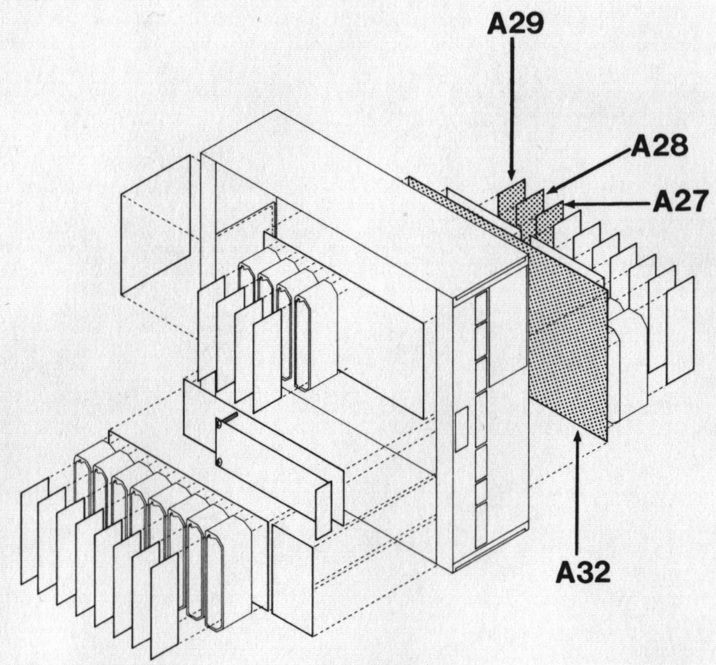


A27 IF ZERO CARRIER/PHASE SHIFTER BOARD



SN B010278—UP

A28 IF DETECTOR-VIDEO AMPLIFIER (QUADRATURE) BOARD
A29 IF DETECTOR-VIDEO AMPLIFIER (VIDEO) BOARD



Static Sensitive Devices
See Maintenance Section

COMPONENT NUMBER EXAMPLE

Component Number
A23 A2 R1234
Assembly Number — *Subassembly Number (if used)* — *Schematic Circuit Number*

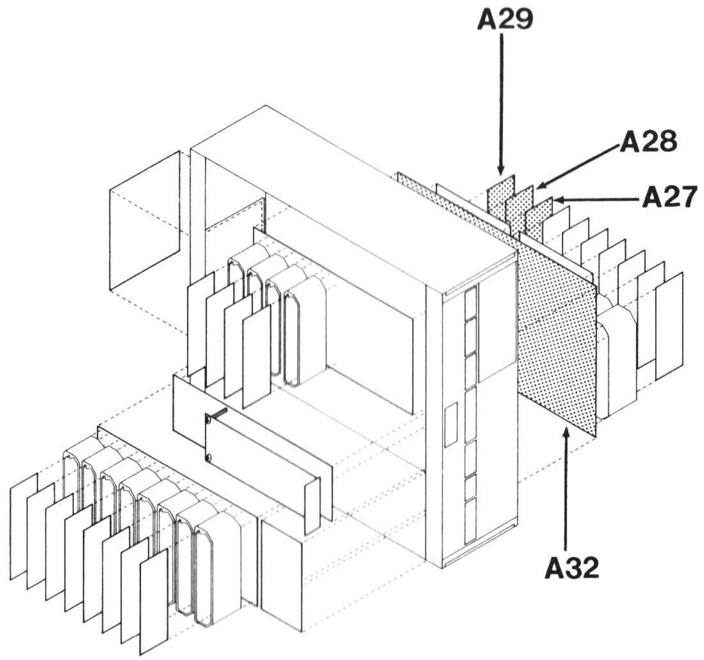
Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

Circuit Number	Schematic Location
ASSY A27	
C03	B2
C10	B2
C27	B2
C31	B2
C56	D2
C57	B1
C88	B1
C95	C1
CR53	C1
CR66	C1
CR74	C1
CR75	C1
CR84	C1
CR85	C1
L13	B2
L21	B2
L25	B2
L48	D2
L89	C1
L98	C1
Q58	B1
R33	B2
R43	D2
R44	D2
R45	C1
R53*	C1
R55	B1
R58	B1
R62	C1
R66	B1
R68	B1
R72	C1
R73	C1
R75	C1
R82	C1
R83	C1
R84	C1
R94	C1
T55	C1
T65	C1
T94	C1
ASSY A28	
C05	B3
C07	B3
C17	B3
C34	A3
C41	A4
C47	A4
C51	A3
C57	A4
C58	A5
C59	B5
C66	A4
C76	A5
C78	B5
C86	A5
C98	A5
E83	A5
L38	B2
L44	A4
L54	A4
L64	A4
L88	A5
L89	A5
LR14	A3
LR24	B3
P71	A5

G

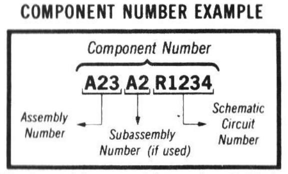
R62
SN B000100—B000119)

SN B010278—UP



Static Sensitive Devices
See Maintenance Section

COMPONENT NUMBER EXAMPLE



Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List

IF Detection ⟨4⟩

ASSY A27

Circuit Number	Schematic Location	Board Location
C03	B2	A2
C10	B2	A1
C27	B2	B2
C31	B2	C1
C56	D2	D2
C57	B1	D2
C88	B1	E2
C95	C1	E2
CR53	C1	D1
CR66	C1	D2
CR74	C1	D2
CR75	C1	D2
CR84	C1	E2
CR85	C1	E2
L13	B2	B2
L21	B2	B1
L25	B2	B2
L48	D2	C2
L89	C1	E2
L98	C1	E3
Q58	B1	D2
R33	B2	C1
R43	D2	C2
R44	D2	C2
R45	C1	C2
R53*	C1	D1
R55	B1	D2
R58	B1	D2
R62	C1	G1
R66	B1	D2
R68	B1	D2
R72	C1	D1
R73	C1	D1
R75	C1	E2
R82	C1	E1
R83	C1	E1
R84	C1	E2
R94	C1	F1
T55	C1	D2
T65	C1	D2
T94	C1	F2

ASSY A28

Circuit Number	Schematic Location	Board Location
C05	B3	A5
C07	B3	A5
C17	B3	B5
C34	A3	C5
C41	A4	C4
C47	A4	C5
C51	A3	D4
C57	A4	D5
C58	A5	D6
C59	B5	D6
C66	A4	D5
C76	A5	E5
C78	B5	E6
C86	A5	E5
C98	A5	F6
E83	A5	E5
L38	B2	C6
L44	A4	C5
L54	A4	C5
L64	A4	D5
L88	A5	E6
L89	A5	E6
LR14	A3	B5
LR24	B3	B5
P71	A5	E4
Q11	A3	B4
Q20	A3	B4
Q21	A3	B4
Q31	A3	C4
Q71	A4	E4
Q81	A4	E4
Q83	A5	E5
Q86	A5	F5
R01	B4	A4
R02	B4	A4
R11	B4	A4
R12	B4	A4
R14	B3	B5
R16	B3	B5
R19	B3	B6
R23	A3	B5
R24	A3	B5
R25	A3	B5
R31	A3	C4
R37	A2	B5
R40	A3	C4
R41	A3	C4
R42	A3	C4
R43	A3	C4
R60	A4	D4
R61	A4	D4
R62	B5	D4
R64	A4	D5
R72	A4	E4
R77	A5	E5
R83	A5	E5
R85	A5	E5
R86	B5	E5
R87	A5	E6
R88	A5	E6
R89	A5	E6
R90	A4	F4
R91	A4	F4
R92	A4	F4
R93	A4	F5
R95	A5	F5
R97	A5	F5
T09	B3	A6
T27	A3	B6
U14	A3	A5
VR94	A5	F5

ASSY A29

Circuit Number	Schematic Location	Board Location
C05	D3	A5
C07	D3	A5
C17	D3	B5
C34	C3	C5
C41	C4	C4
C47	C4	C5
C51	C3	D4
C57	C4	D5
C58	C5	D6
C59	D5	D6
C66	C4	D5
C76	C5	E5
C78	D5	E6
C86	C5	E5
C98	D5	F6
E83	C5	E5
L38	D2	C6
L44	C4	C5
L54	C4	C5
L64	C4	D5
L88	C5	E6
L89	C5	E6
LR14	C3	B5
LR24	D3	B5
P71	C5	E4
Q11	C3	B4
Q20	C3	B4
Q21	C3	B4
Q31	C3	C4
Q71	C4	E4
Q81	C4	E4
Q83	C5	E5
Q86	C5	F5
R01	D4	A4
R02	D4	A4
R11	D4	A4
R12	D4	A4
R14	D3	B5
R16	D3	B5
R19	D3	B6
R23	D3	B5
R24	C3	B5
R25	C3	B5
R31	C3	C4
R37	D2	B5
R40	C3	C4
R41	C3	C4
R42	C3	C4
R43	C3	C4
R60	D4	D4
R61	C4	D4
R62	D5	D4
R64	C4	D5
R72	C4	E4
R77	C5	E5
R83	C5	E5
R85	C5	E5
R86	D5	E5
R87	C5	E6
R88	C5	E6
R89	C5	E6
R90	C4	F4
R91	C4	F4
R92	D4	F4
R93	C4	F5
R95	C5	F5
R97	C5	F5
T09	D3	A6
T27	C3	B6
U14	C3	A5
VR94	C5	F5

P/O ASSY A32

Circuit Number	Schematic Location	Board Location
P90	A5	M1
P91	A5	M1
P94	D5	L1
P95	C5	L1
P96	C5	K1
P98	A2	J1

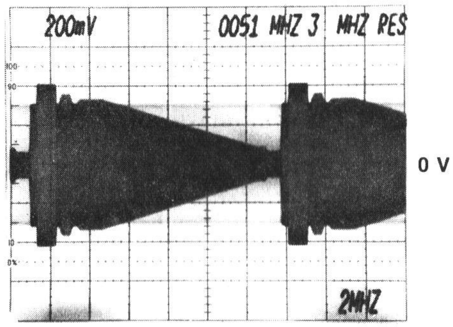
Component locations for A32 are shown on the reverse side of the block diagram.

*** Note applicable serial number ranges for earlier board versions.**

2200-132

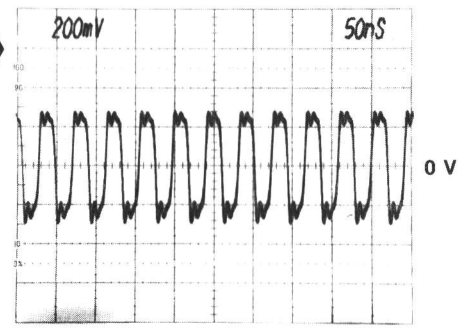
4

1



200mV
0051 MHZ 3 MHZ RES
2MHZ
0 V

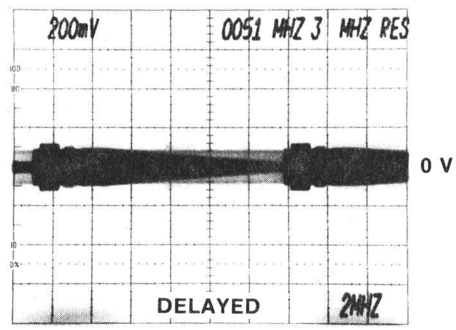
2



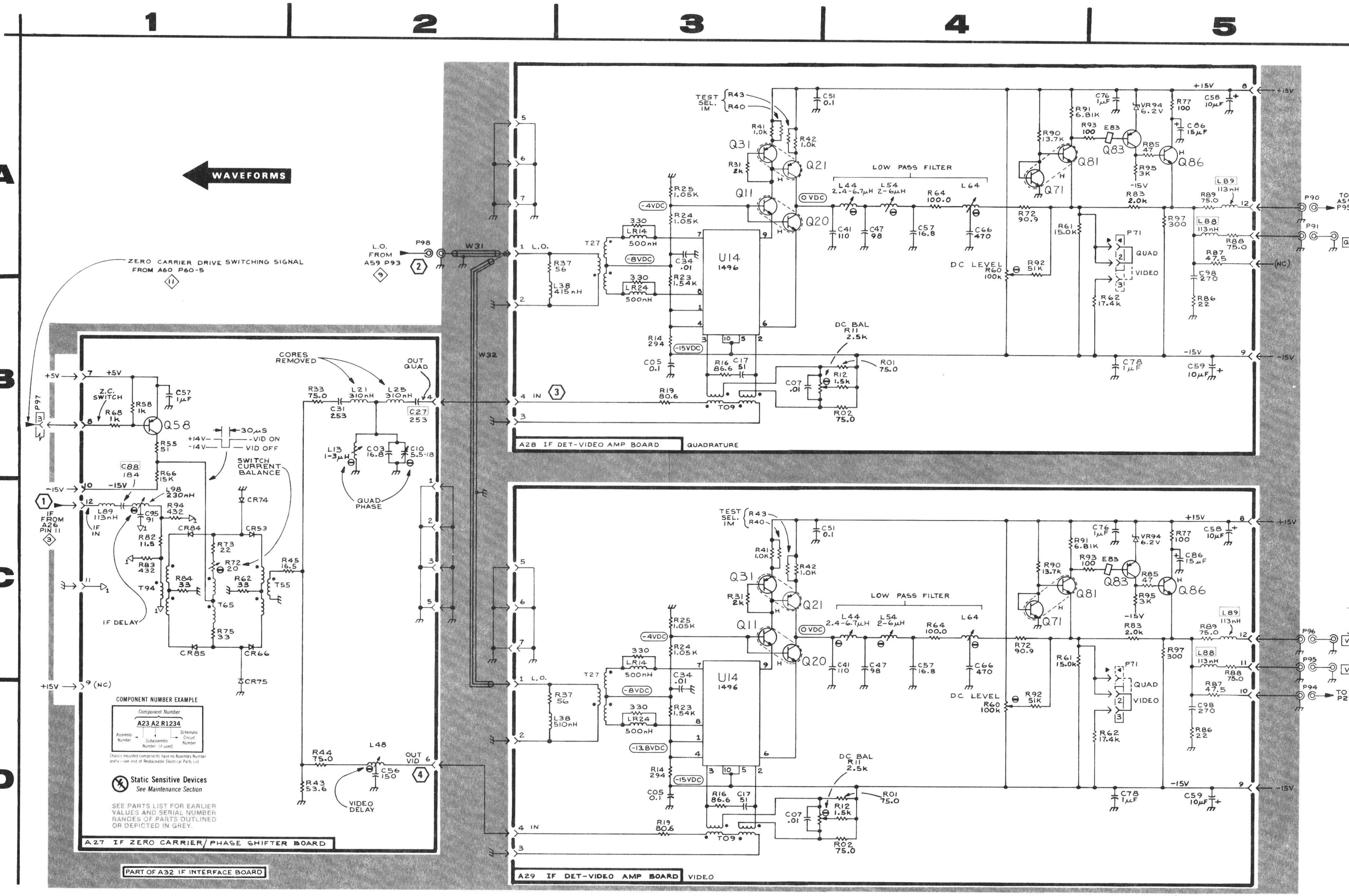
200mV
50nS
0 V

3

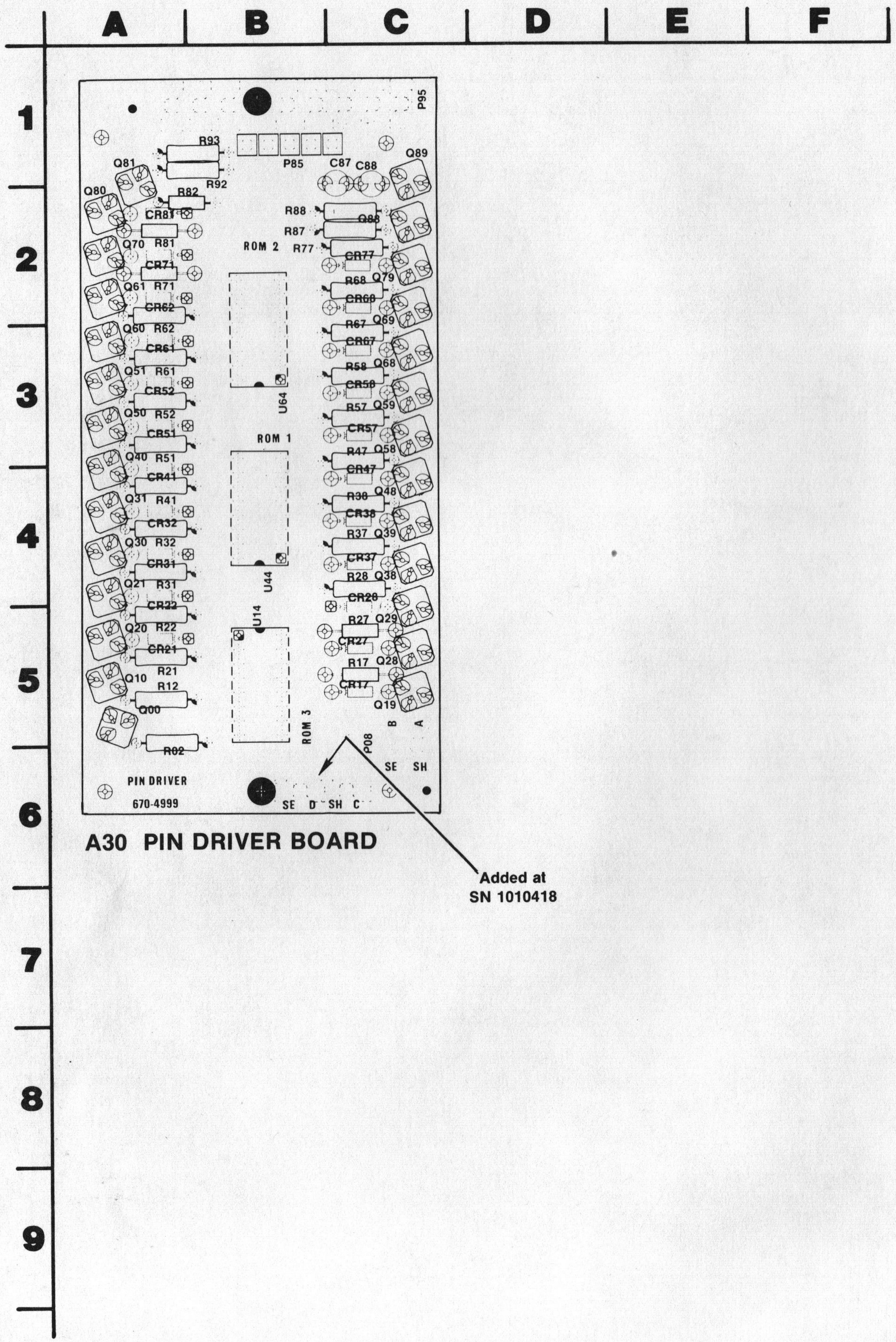
4



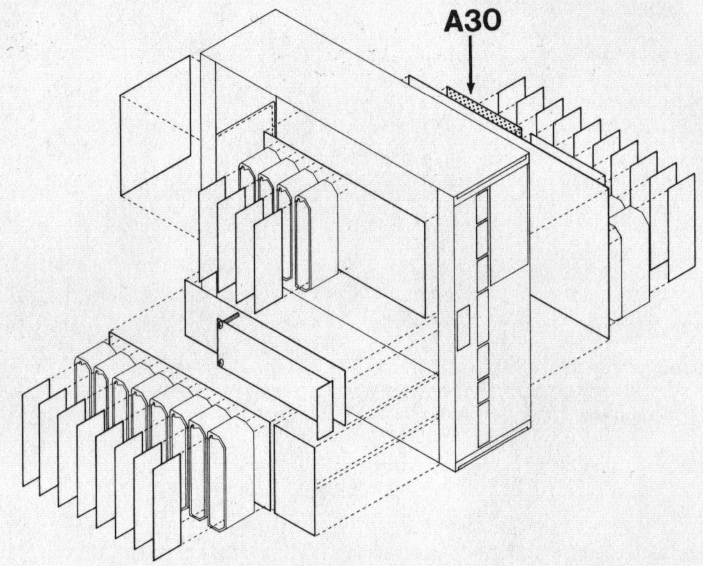
200mV
0051 MHZ 3 MHZ RES
DELAYED
2MHZ
0 V



IF DETECTION
A27, A28, A29



A30 PIN DRIVER BOARD



Static Sensitive Devices
See Maintenance Section

COMPONENT NUMBER EXAMPLE

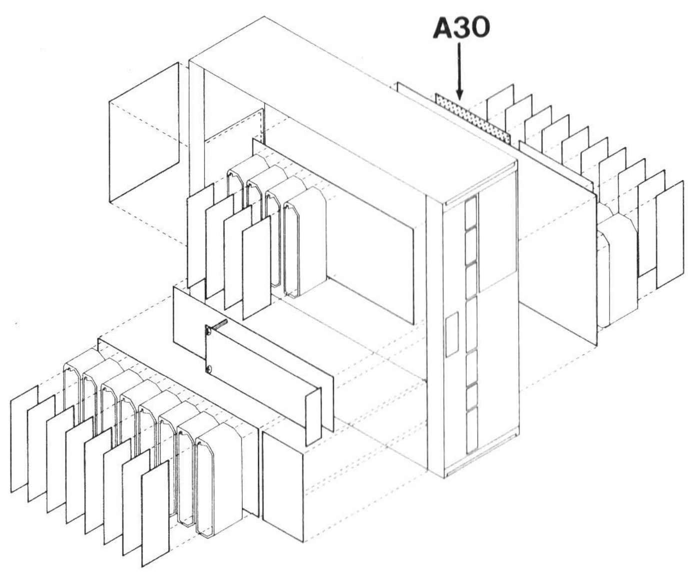
Component Number

A23 A2 R1234

Assembly Number — *Subassembly Number (if used)* — *Schematic Circuit Number*

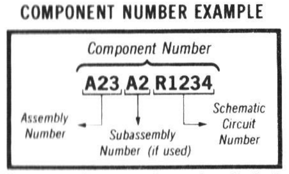
Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

@



Static Sensitive Devices
See Maintenance Section

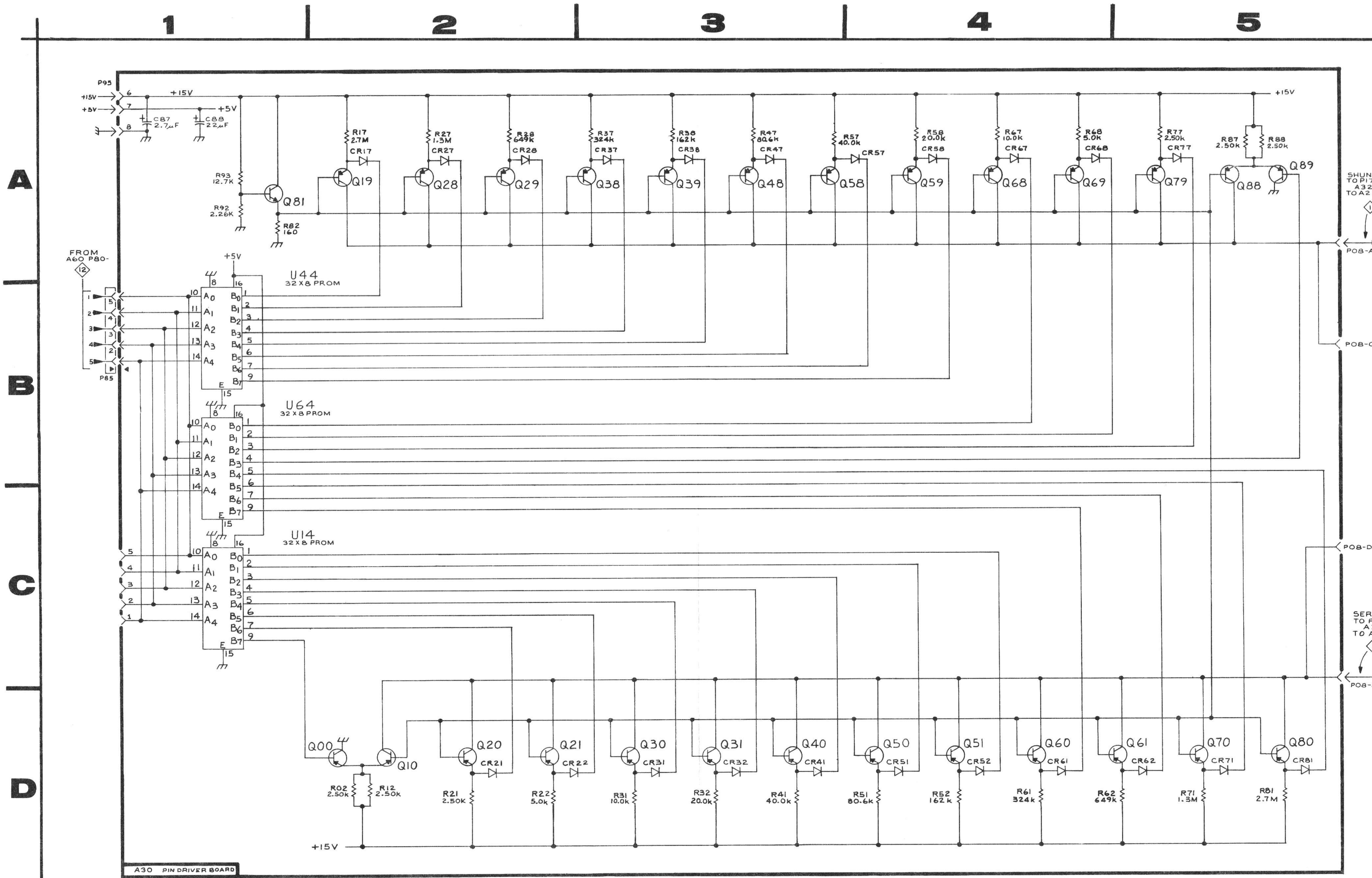
COMPONENT NUMBER EXAMPLE



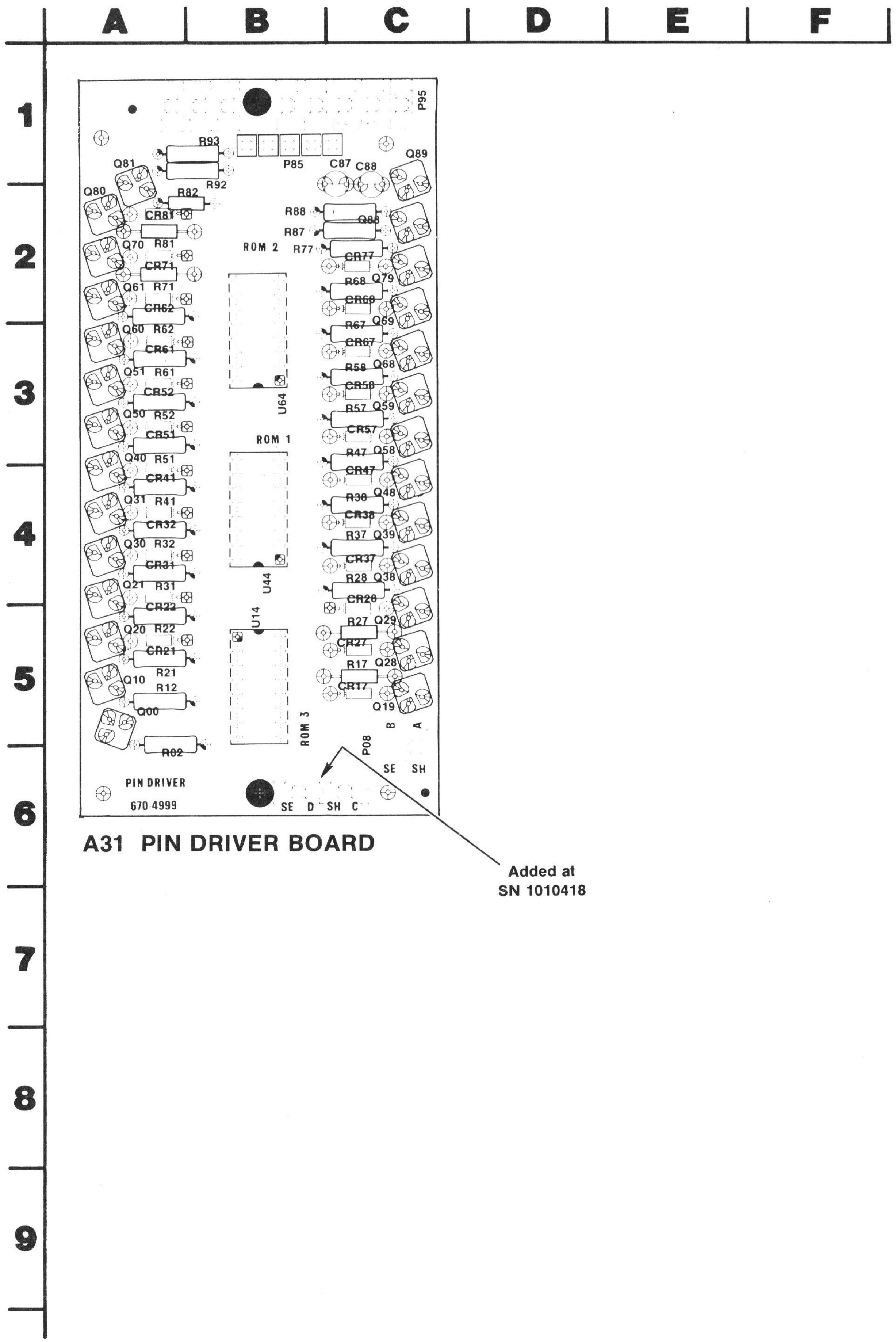
Chassis mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

Pin Driver ⟨5⟩

Circuit Number	Schematic Location	Board Location
ASSY A30		
C87	A1	C1
C88	A1	C1
CR17	A2	C5
CR21	D2	A5
CR22	D2	A4
CR27	A2	C5
CR28	A2	C4
CR31	D3	A4
CR32	D3	A4
CR37	A3	C4
CR38	A3	C4
CR41	D3	A4
CR47	A3	C3
CR51	D4	A3
CR52	D4	A3
CR57	A4	C3
CR58	A4	C3
CR61	D4	A3
CR62	D5	A2
CR67	A4	C3
CR68	A4	C2
CR71	D5	A2
CR77	A5	C2
CR81	D5	A2
Q00	D2	A5
Q10	D2	A5
Q19	A2	C5
Q20	D2	A5
Q21	D2	A4
Q28	A2	C5
Q29	A2	C5
Q30	D3	A4
Q31	D3	A4
Q38	A3	C4
Q39	A3	C4
Q40	D3	A3
Q48	A3	C4
Q50	D4	A3
Q51	D4	A3
Q58	A4	C3
Q59	A4	C3
Q60	D4	A2
Q61	D5	A2
Q68	A4	C3
Q69	A4	C2
Q70	D5	A2
Q79	A5	C2
Q80	D5	A2
Q81	A1	A1
Q88	A5	C2
Q89	A5	C1
R02	D2	A5
R12	D2	A5
R17	A2	C5
R21	D2	A5
R22	D2	A5
R27	A2	C5
R28	A2	C4
R31	D3	A4
R32	D3	A4
R37	A3	C4
R38	A3	C4
R41	D3	A4
R47	A3	C3
R51	D4	A3
R52	D4	A3
R57	A4	C3
R58	A4	C3
R61	D4	A3
R62	D4	A2
R67	A4	C2
R68	A4	C2
R71	D5	A2
R77	A5	C2
R81	D5	A2
R82	A1	A2
R87	A5	C2
R88	A5	C2
R92	A1	B1
R93	A1	B1
U14	C1	B5
U44	A1	B4
U64	B1	B3

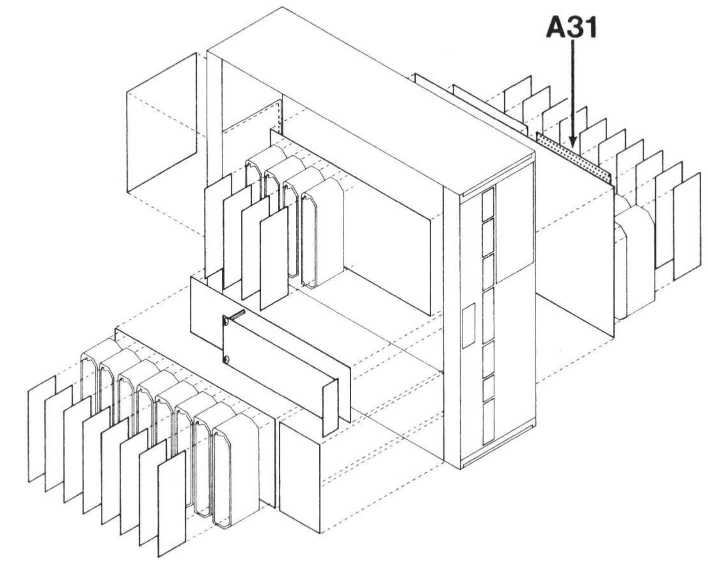

1
2
3
4
5
A
B
C
D
P95
+15V
+5V
C87 2.7µF
C88 22µF
R93 12.7K
R92 2.26K
Q81
R82 160
R17 2.7M
CR17
Q19
R27 1.3M
CR27
Q28
R28 649k
CR28
Q29
R37 324k
CR37
Q38
R38 162k
CR38
Q39
R47 80.6k
CR47
Q48
R57 40.0k
CR57
Q58
R58 20.0k
CR58
Q59
R67 10.0k
CR67
Q68
R68 5.0k
CR68
Q69
R77 2.50k
CR77
Q79
R87 2.50k
R88 2.50k
Q88
Q89
SHUNT I TO P17-A A32 TO A21-1
P08-A
P08-C
P08-D
P08-B
SERIES I TO P17-B A32 TO A21-2
FROM A60 P80-
P85
U44 32 X 8 PROM
U64 32 X 8 PROM
U14 32 X 8 PROM
Q00
Q10
R02 2.50k
R12 2.50k
Q20
CR21
R21 2.50k
Q21
CR22
R22 5.0k
Q30
CR31
R31 10.0k
Q31
CR32
R32 20.0k
Q40
CR41
R41 40.0k
Q50
CR51
R51 80.6k
Q51
CR52
R52 162k
Q60
CR61
R61 324k
Q61
CR62
R62 649k
Q70
CR71
R71 1.3M
Q80
CR81
R81 2.7M
A30 PIN DRIVER BOARD

PIN DRIVER ⟨5⟩



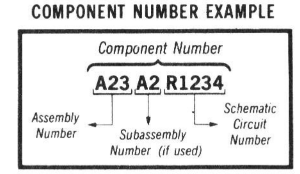
A31 PIN DRIVER BOARD

Added at
SN 1010418

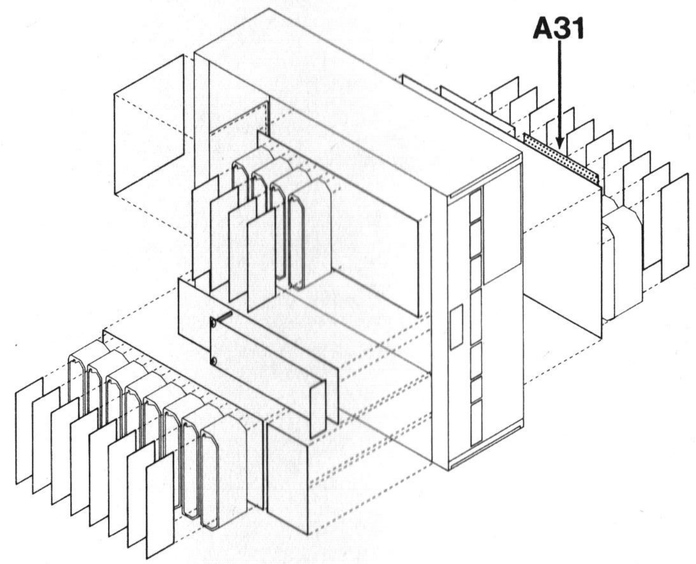


Static Sensitive Devices
See Maintenance Section

COMPONENT NUMBER EXAMPLE



Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.



Static Sensitive Devices
See Maintenance Section

COMPONENT NUMBER EXAMPLE

Component Number

A23 A2 R1234

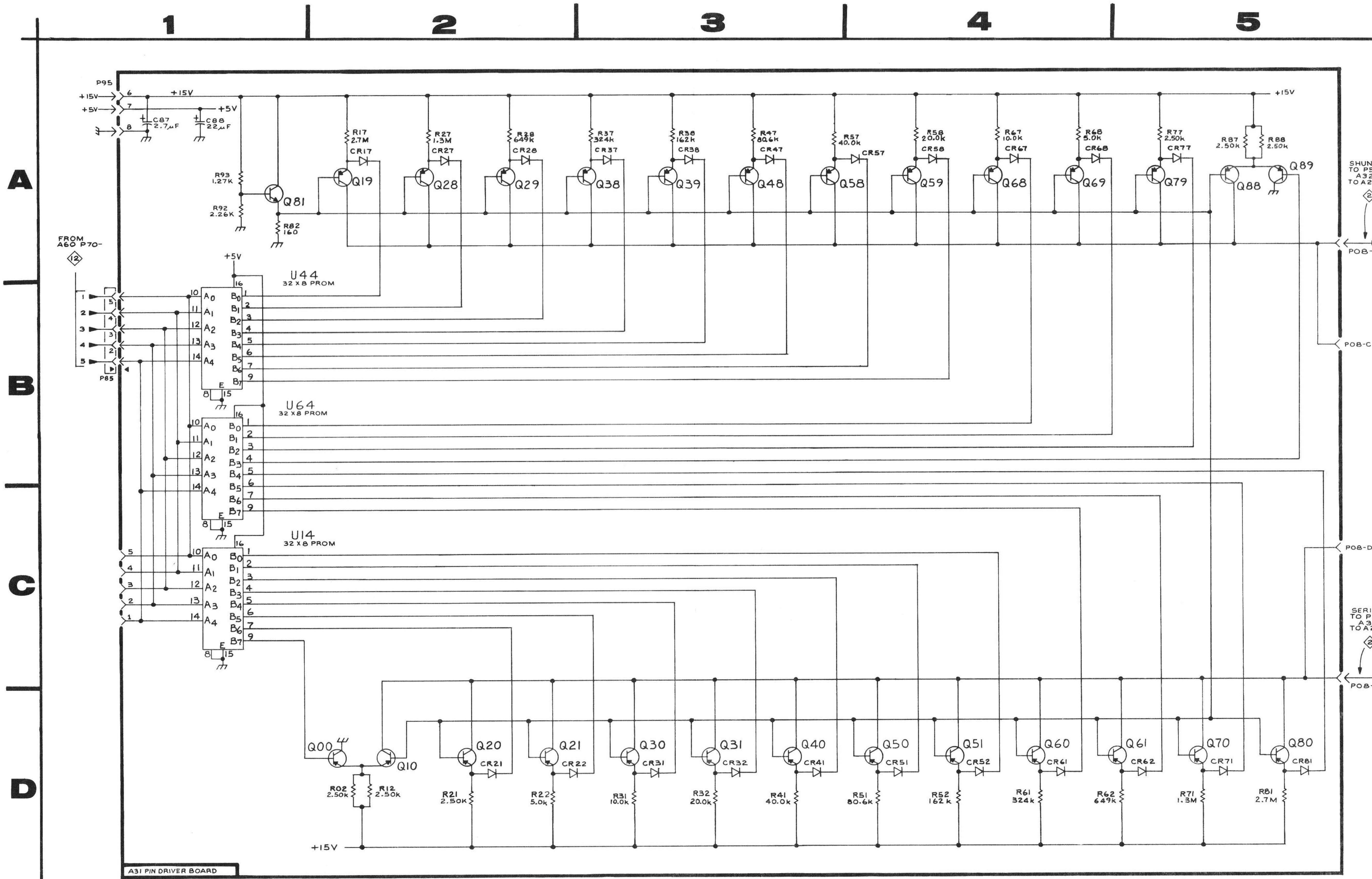
Assembly Number — *Subassembly Number (if used)* — *Schematic Circuit Number*

Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

Pin Driver ⟨5⟩A

Circuit Number	Schematic Location	Board Location
ASSY A31		
C87	A1	C1
C88	A1	C1
CR17	A2	C5
CR21	D2	A5
CR22	D2	A5
CR27	A2	C5
CR28	A2	C4
CR31	D3	A4
CR32	D3	A4
CR37	A3	C4
CR38	A3	C4
CR41	D3	A4
CR47	A3	C4
CR51	D4	A3
CR52	D4	A3
CR57	A4	C3
CR58	A4	C3
CR61	D4	A3
CR62	D5	A2
CR67	A4	C3
CR68	A4	C2
CR71	D5	A2
CR77	A5	C2
CR81	D5	A2
Q00	D2	A5
Q10	D2	A5
Q19	A2	C5
Q20	D2	A5
Q21	D2	A4
Q28	A2	C5
Q29	A2	C5
Q30	D3	A4
Q31	D3	A4
Q38	A3	C4
Q39	A3	C4
Q40	D3	A3
Q48	A3	C4
Q50	D4	A3
Q51	D4	A3
Q58	A4	C3
Q59	A4	C3
Q60	D4	A3
Q61	D5	A2
Q68	A4	C3
Q69	A4	C2
Q70	D5	A2
Q79	A5	C2
Q80	D5	A2
Q81	A1	A1
Q88	A5	C2
Q89	A5	C1
R02	D2	A5
R12	D2	A5
R17	A2	C5
R21	D2	A5
R22	D2	A5
R27	A2	C5
R28	A2	C4
R31	D3	A4
R32	D3	A4
R37	A3	C4
R38	A3	C4
R41	D3	A4
R47	A3	C3
R51	D4	A3
R52	D4	A3
R57	A4	C3
R58	A4	C3
R61	D4	A3
R62	D4	A2
R67	A4	C3
R68	A4	C2
R71	D5	A2
R77	A5	C2
R81	D5	A2
R82	A1	A2
R87	A5	C2
R88	A5	C2
R92	A1	B1
R93	A1	B1
U14	C1	B5
U44	A1	B4
U64	B1	B3

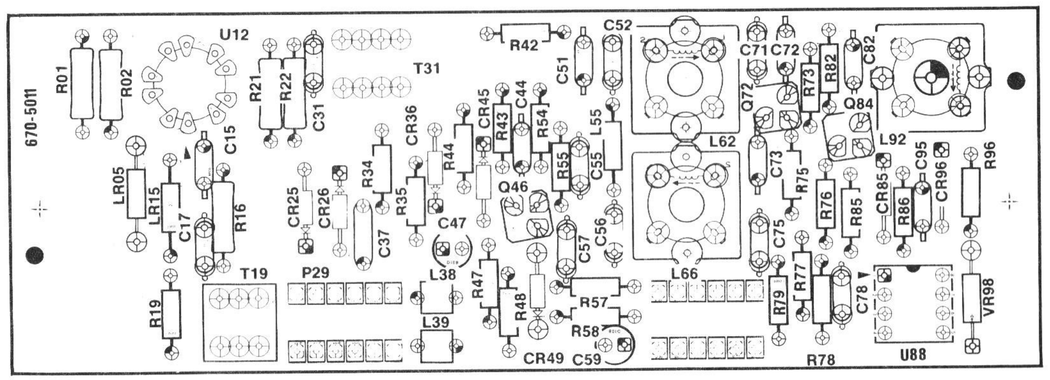
2200-134



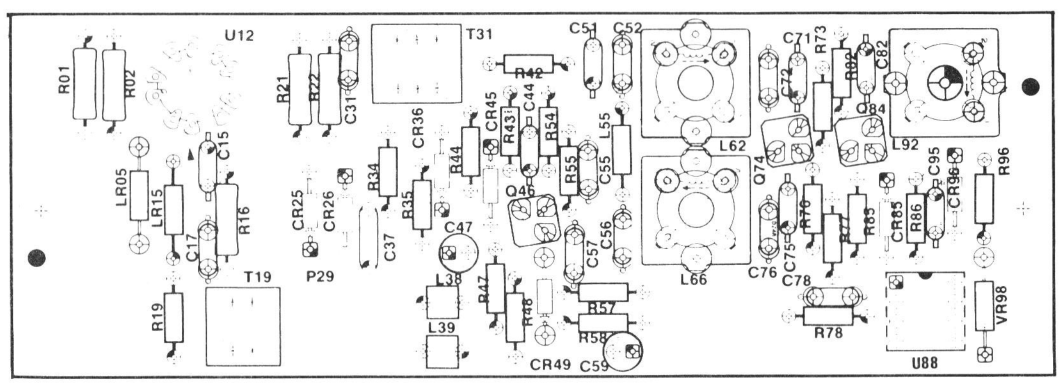
1450-1

@ 2200-156

PIN DRIVER 5A

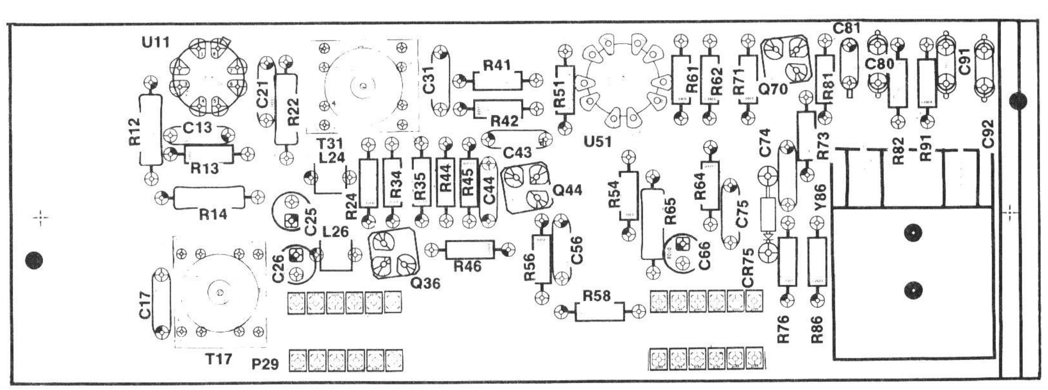


A40 1st AUDIO MIXER BOARD
(SN B010215—UP)

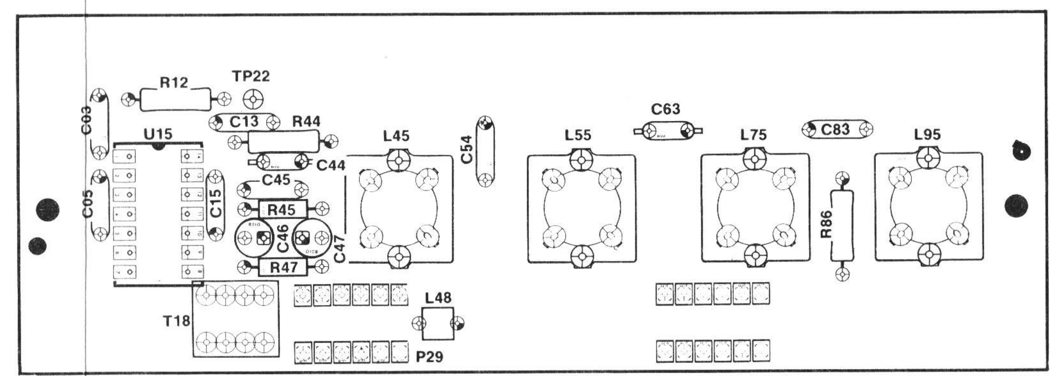


A40 1st AUDIO MIXER BOARD
(SN B000100—B010214)

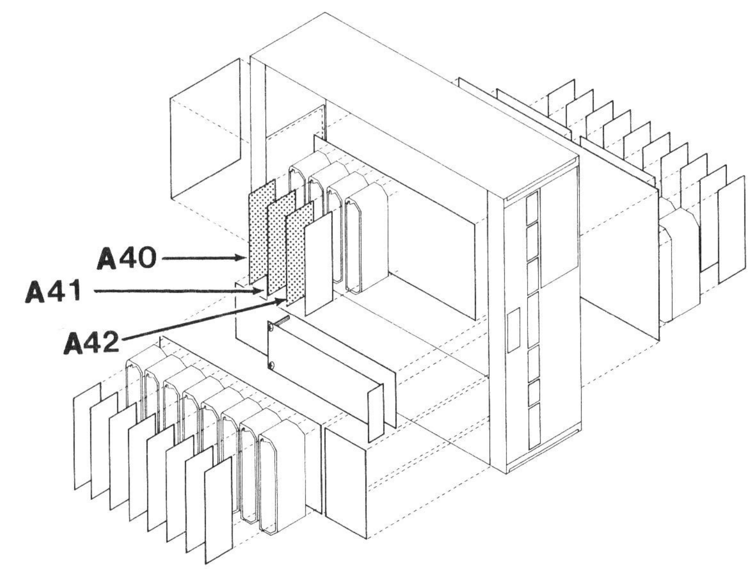
R75, R79
(On back of board)



A41 2nd AUDIO MIXER BOARD



A42 AUDIO LIMITER BOARD



Static Sensitive Devices
See Maintenance Section

COMPONENT NUMBER EXAMPLE

Component Number

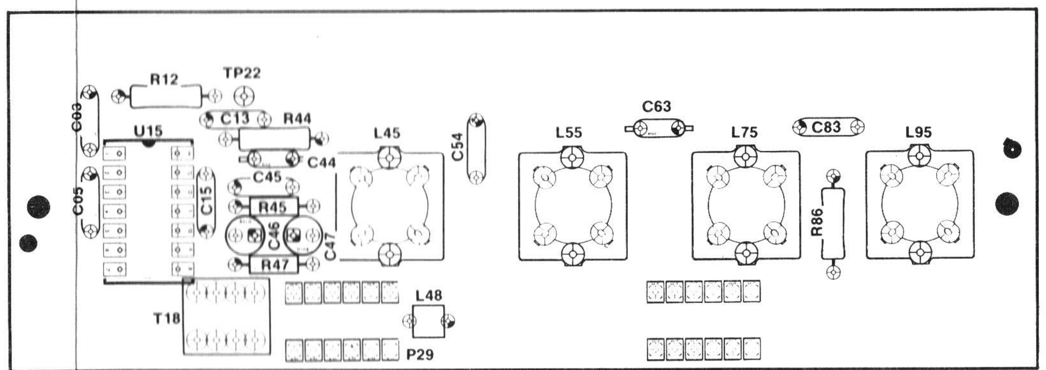
A23 A2 R1234

Assembly Number — *Subassembly Number (if used)* — *Schematic Circuit Number*

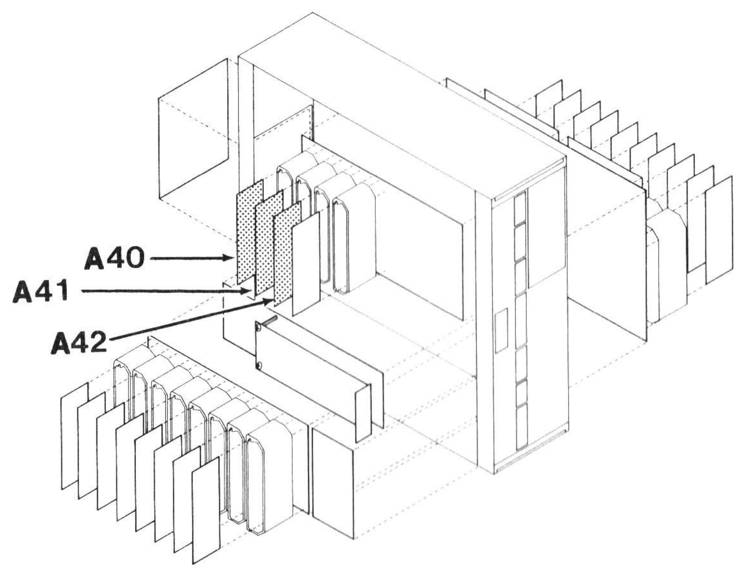
Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

Circuit Number	Schematic Location
ASSY A40	
C15	C2
C17	C1
C31	C1
C37	B1
C44	B1
C47	A1
C51	D2
C52	D1
C55	B1
C56	D1
C57	A1
C59	A1
C71	D1
C71*	D2
C72	D2
C72*	D1
C73	D2
C75	D1
C75*	D2
C76*	D1
C78	D2
C82	D2
C95	D3
CR25	B2
CR26	B2
CR36	B2
CR45	B2
CR49	A1
CR85	D3
CR96	D2
L38	A1
L39	A1
L55	D1
L62	D1
L66	D1
L92	D2
LR05	C1
LR15	C1
LR19	C1
Q46	A1
Q72	D2
Q74*	D2
Q84	D2
R01	C1
R02	C1
R16	C1
R21	C1
R22	C1
R34	B2
R35	B1
R42	D2
R43	B1
R44	B2
R47	B1
R48	A1
R54	A1

G | H | I | J | K | L

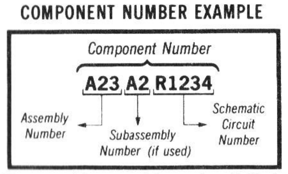


A42 AUDIO LIMITER BOARD



Static Sensitive Devices
See Maintenance Section

COMPONENT NUMBER EXAMPLE



Chassis mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List

Audio Input Board ⟨6⟩

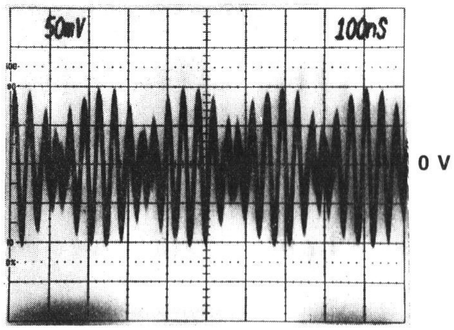
Circuit Number	Schematic Location	Board Location
ASSY A40		
C15	C2	B1,B5
C17	C1	B2,B5
C31	C1	B1,C4
C37	B1	C2,C5
C44	B1	C1,C4
C47	A1	C2,C5
C51	D2	D1,D4
C52	D1	D1,D4
C55	B1	D1,D5
C56	D1	D2,D5
C57	A1	D2,D5
C59	A1	D2,D6
C71	D1	E1
C71*	D2	E4
C72	D2	E1
C72*	D1	E4
C73	D2	E1
C75	D1	E2
C75*	D2	E5
C76*	D1	E5
C78	D2	E2,E5
C82	D2	E1,E4
C95	D3	E2,F5
CR25	B2	B2,B5
CR26	B2	B2,B5
CR36	B2	C1,C4
CR45	B2	C1,C4
CR49	A1	C2,D6
CR85	D3	E2,E5
CR96	D2	F2,F5
L38	A1	C2,C5
L39	A1	C2,C6
L55	D1	D1,D4
L62	D1	D1,D4
L66	D1	D2,D5
L92	D2	E1,E4
LR05	C1	A2,A5
LR15	C1	B2,A5
LR19	C1	B2,B5
Q46	A1	C2,C5
Q72	D2	E1
Q74*	D2	E5
Q84	D2	E1,E4
R01	C1	A1,A4
R02	C1	A1,A4
R16	C1	B2,B5
R21	C1	B1,B4
R22	C1	B1,B4
R34	B2	C2,C5
R35	B1	C2,C5
R42	D2	C1,C4
R43	B1	C1,C4
R44	B2	C1,C5
R47	B1	C2,C5
R48	A1	C2,C5
R54	A1	D1,D4
R55	A1	D2,D5
R57	A1	D2,D5
R58	A1	D2,D5
R73	D2	E1,E4
R75	D2	E2
R75*	D1	E6
R76	D2	E2
R76*	D2	E5
R77	D1	E2
R77*	D2	E5
R78	D2	E2,E5
R79	D1	E2,E6
R82	D2	E1,E4
R85	D3	E2,E5
R86	D3	E2,E5
R96	D3	F2,F5
T19	C1	B2,B5
T31	D2	C1,C4
U12	C2	B1,B4
U88	D3	E2,E6
VR98	D3	F2,F5
ASSY A41		
C13	B2	B8
C17	B2	B8
C21	A2	B7
C25	C3	B8
C26	C3	B8
C31	A3	C7
C43	A3	C8
C44	A3	C8
C56	A3	D8
C66	A3	D8
C74	C3	E8
C75	B3	E8
C80	C3	E7
C81	C3	E7
C91	C2	F7
C92	C2	F7
CR75	C3	E8
L24	C3	B8
L26	C3	B8
Q36	A3	C8
Q44	A3	D8
Q70	C3	E7
R12	B2	A8
R13	B2	B8
R14	B2	B8
R22	A2	B7
R24	A3	C8
R34	A3	C8
R35	A3	C8
R41	B3	C7
R42	B3	C7
R44	A3	C8
R45	A3	C8
R46	A3	C8
R51	B3	D7
R54	B3	D8
R56	A3	C8
R58	A3	D8
R61	B3	D7
R62	B3	D7
R64	B3	D8
R65	B3	D8
R71	B3	E7
R73	C3	E8
R76	C3	E8
R81	C3	E7
R82	C2	E8
R86	C2	E8
R91	C2	F8
T17	B2	B9
T31	B2	C7
U11	B2	B7
U51	B3	D7
Y86	C2	E8
ASSY A42		
C03	B5	G1
C05	B5	G2
C13	B5	H1
C15	B5	H2
C44	B4	H1
C45	B5	H2
C46	B5	H2
C47	B5	I2
C54	B4	I1
C63	B4	J1
C83	B4	K1
L45	B4	I1
L48	B5	I2
L55	B4	J1
L75	B4	K1
L95	B4	L1
R12	B5	H1
R44	B4	H1
R45	B5	H2
R47	B5	H2
R86	B4	K2
T18	B5	H1
TP22	B4	H1
U15	B5	H1

*** Note applicable serial number ranges for earlier board versions.**

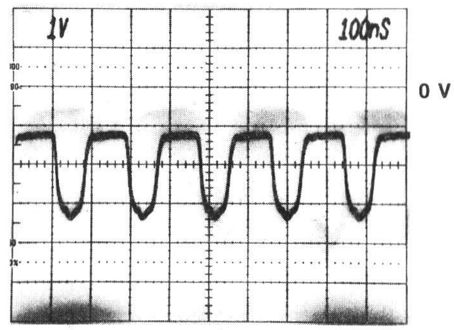
2200-135

6

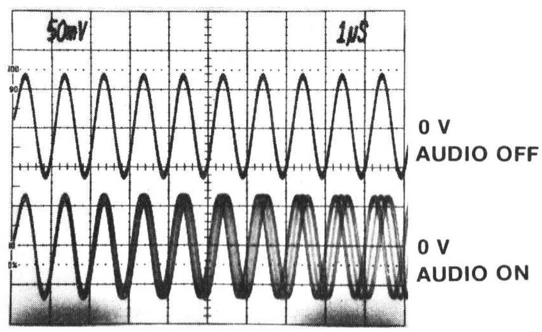
1

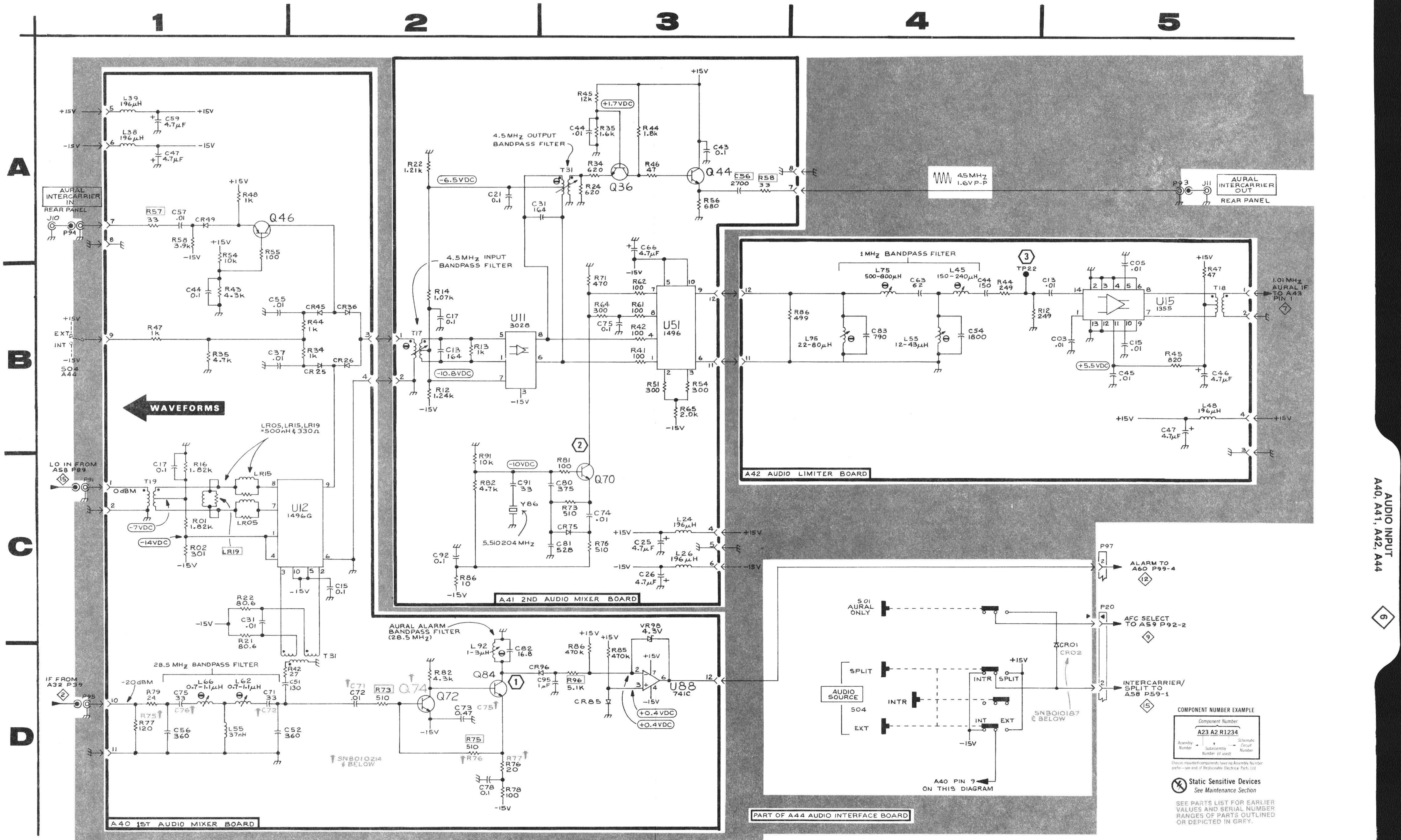


2

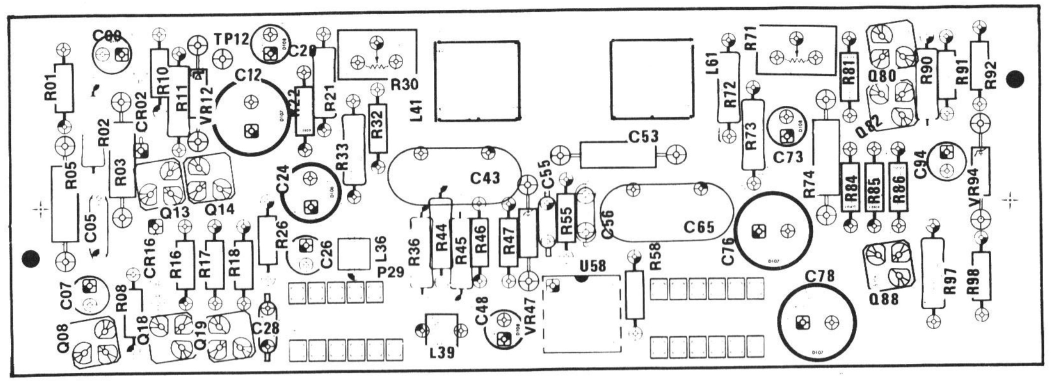


3

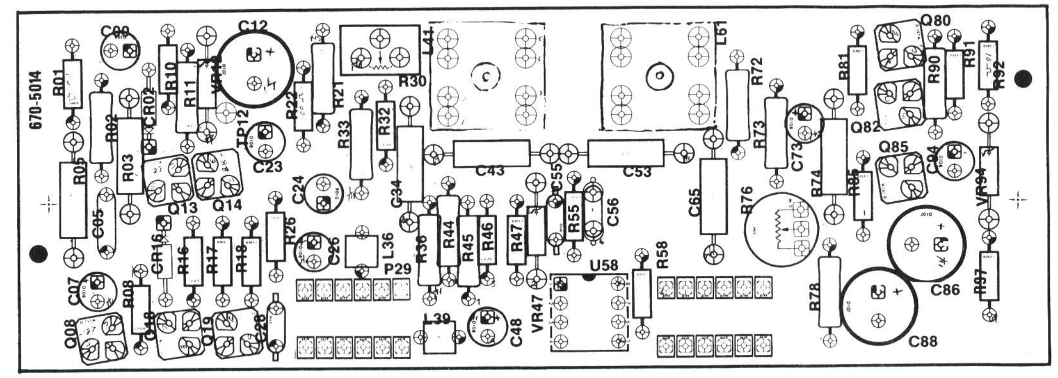



A40 1ST AUDIO MIXER BOARD
A41 2ND AUDIO MIXER BOARD
A42 AUDIO LIMITER BOARD
PART OF A44 AUDIO INTERFACE BOARD
WAVEFORMS
AURAL INTERCARRIER IN
REAR PANEL
AURAL INTERCARRIER OUT
REAR PANEL
4.5MHz OUTPUT BANDPASS FILTER
4.5MHz INPUT BANDPASS FILTER
1MHz BANDPASS FILTER
28.5 MHz BANDPASS FILTER
AURAL ALARM BANDPASS FILTER (28.5 MHz)
LO IN FROM A58 P89
IF FROM A32 P39
1.01MHz AURAL IF TO A43 PIN 1
ALARM TO A60 P99-4
AFC SELECT TO A59 P92-2
INTERCARRIER/ SPLIT TO A58 P59-1
A40 PIN 9 ON THIS DIAGRAM
AUDIO SOURCE
COMPONENT NUMBER EXAMPLE
Static Sensitive Devices
See Maintenance Section
SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES OF PARTS OUTLINED OR DEPICTED IN GREY.
AUDIO INPUT
A40, A41, A42, A44

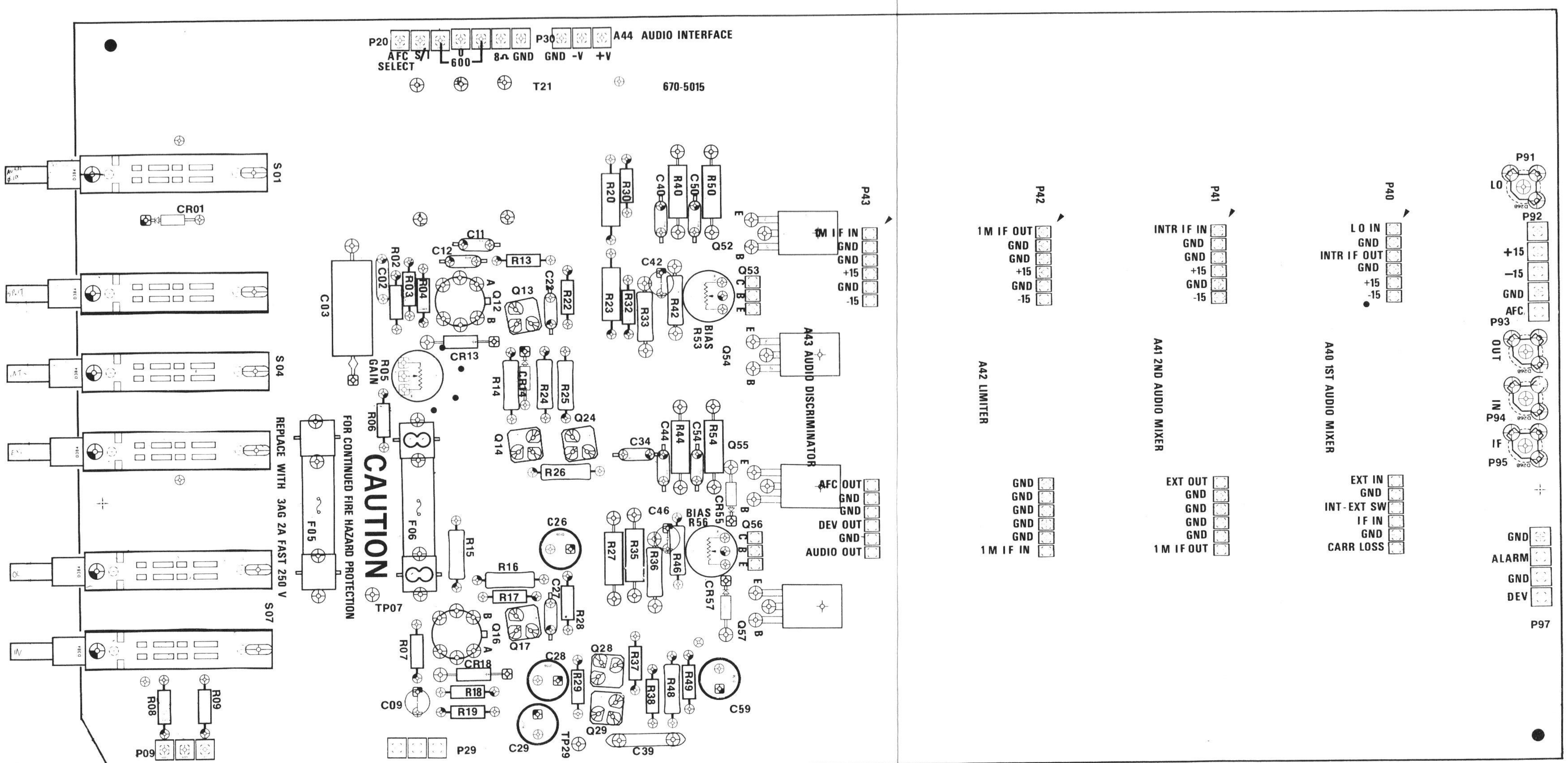
A | B | C | D | E | F | G | H | I | J | K | L | M | N



A43 AUDIO DISCRIMINATOR BOARD
(SN B010384—UP)



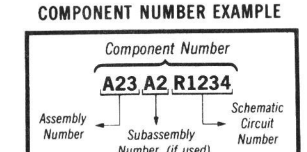
A43 AUDIO DISCRIMINATOR BOARD
(SN B010383—BELOW)



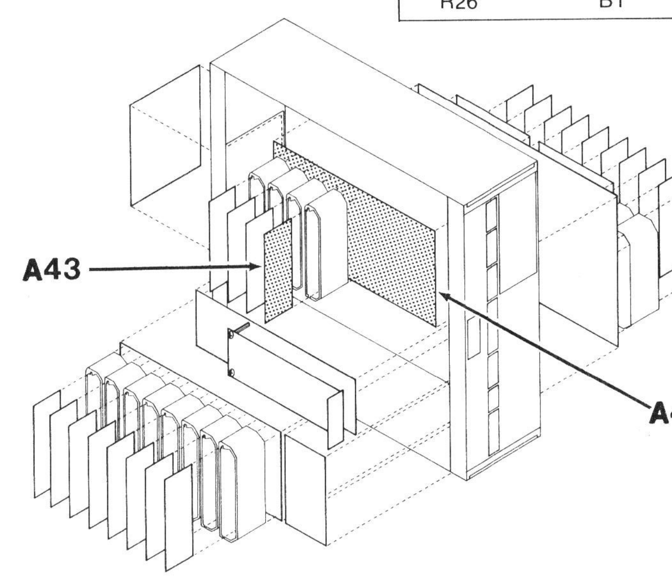
A44 AUDIO INTERFACE BOARD
(SN B010188—UP)

Static Sensitive Devices
See Maintenance Section

COMPONENT NUMBER EXAMPLE



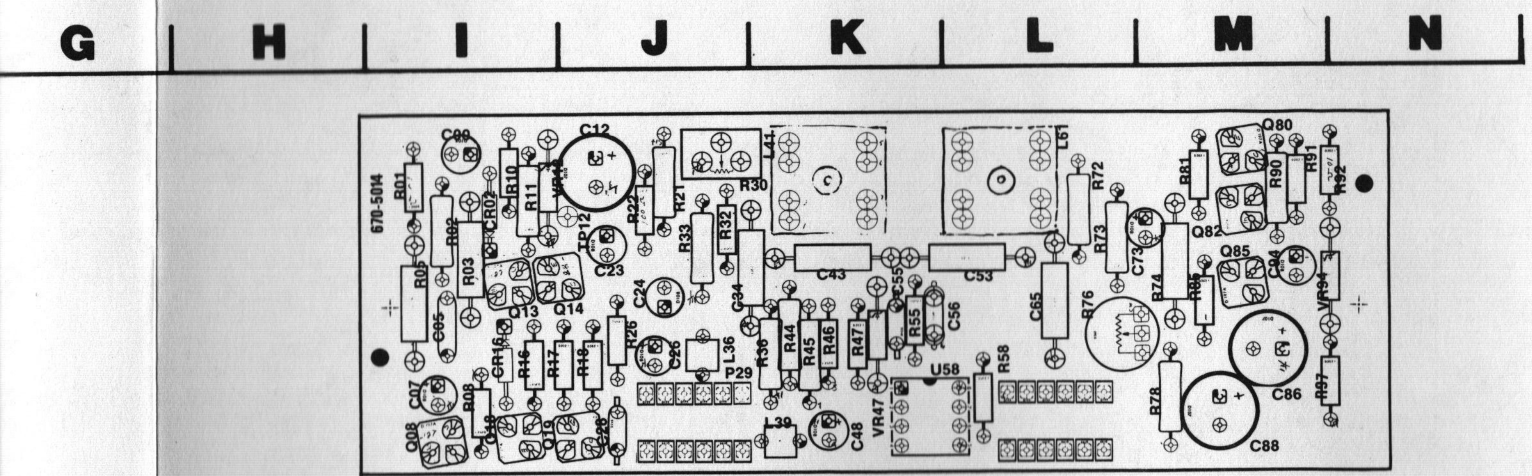
Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.



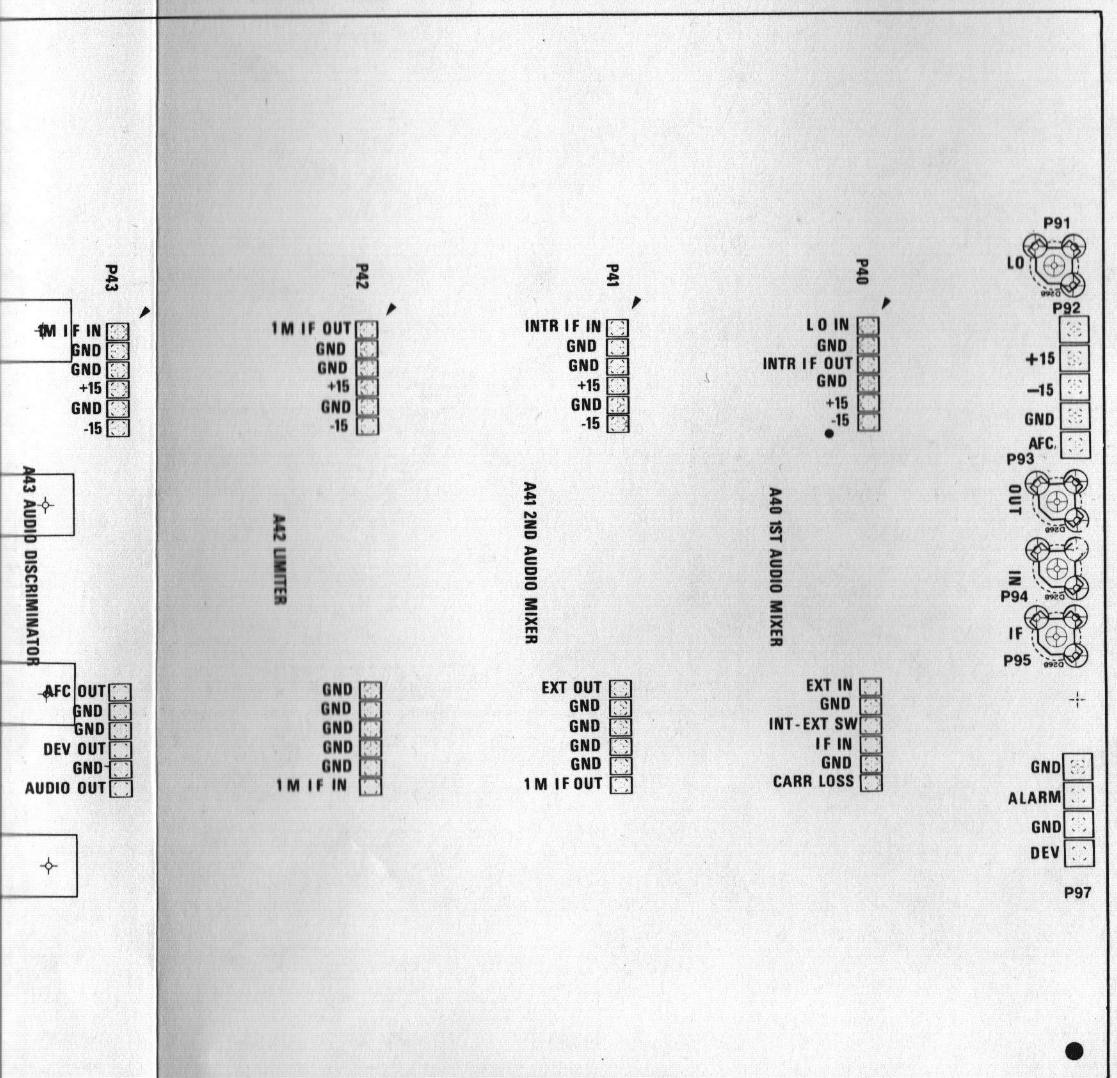
Circuit Number	Schematic Location
ASSY A43	
C00	A1
C05	B1
C07	A1
C12	A1
C20	B1
C23*	B1
C24	B2
C26	B1
C28	B1
C34*	B2
C43	B2
C43*	B2
C48	B1
C53	B2
C55	C2
C56	C2
C65	B2
C73	B3
C78	A3
C86*	B3
C88*	A3
C94	A2
CR02	A1
CR16	A1
L36	B1
L39	B1
L41	B2
L61	B2
Q08	B1
Q13	B2
Q14	B2
Q18	B1
Q19	B1
Q80	A2
Q82	A2
Q85*	A3
Q88	A3
R01	A1
R02	B1
R03	A1
R05	A1
R08	B1
R10	A1
R11	A2
R16	B1
R17	B1
R18	B1
R21	B2
R22	B2
R26	B1

COMPONENT LOCATIONS
A43, A44

@

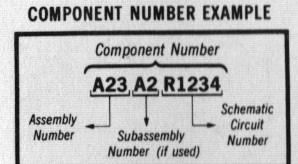


A43 AUDIO DISCRIMINATOR BOARD
(SN B010383—BELOW)

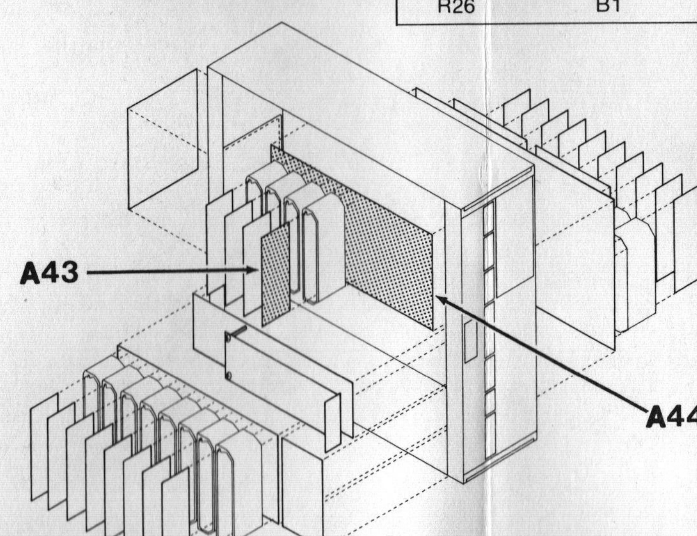


Static Sensitive Devices
See Maintenance Section

COMPONENT NUMBER EXAMPLE



Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.



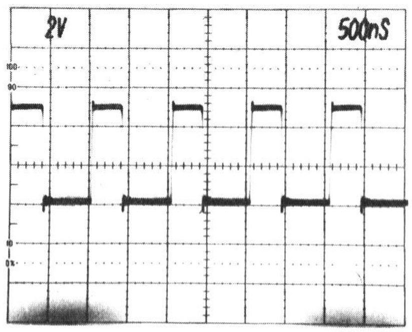
Audio Output ⟨7⟩

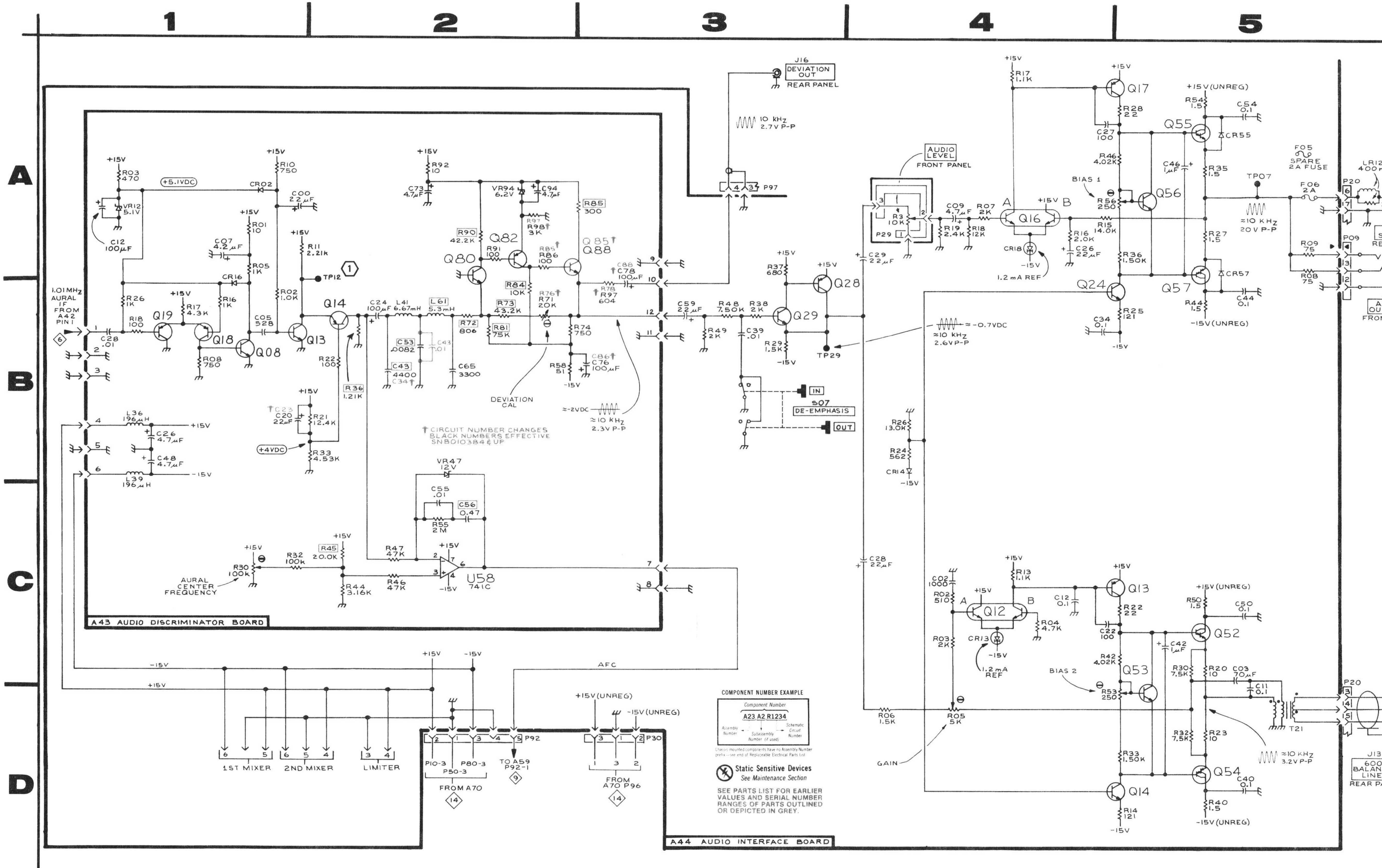
Circuit Number	Schematic Location	Board Location
ASSY A43		
C00	A1	A1,I1
C05	B1	A2,I2
C07	A1	A2,I2
C12	A1	B1,J1
C20	B1	B1
C23*	B1	J1
C24	B2	B2,J2
C26	B1	B2,J2
C28	B1	B2,J2
C34*	B2	J2
C43	B2	C2
C43*	B2	K1
C48	B1	C2,K2
C53	B2	D1,L1
C55	C2	C2,K2
C56	C2	D2,L2
C65	B2	D2,L2
C73	B3	E2
C78	A3	E2
C86*	B3	M2
C88*	A3	M2
C94	A2	F1,M1
CR02	A1	A1,I1
CR16	A1	A2,I2
L36	B1	C2,J2
L39	B1	C2,K2
L41	B2	C1,K1
L61	B2	D1,L1
Q08	B1	A2,I2
Q13	B2	B2,I2
Q14	B2	B2,J2
Q18	B1	A2,I2
Q19	B1	B2,I2
Q80	A2	E1,M1
Q82	A2	E1,M1
Q85*	A3	M1
Q88	A3	E2
R01	A1	A1,I1
R02	B1	A1,I1
R03	A1	A2,I2
R05	A1	A2,I2
R08	B1	A2,I2
R10	A1	B1,I1
R11	A2	B1,I1
R16	B1	B2,I2
R17	B1	B2,I2
R18	B1	B2,J2
R21	B2	B1,J1
R22	B2	B1,J1
R26	B1	B2,J2
R30	C1	C1,J1
R32	C1	C1,J1
R33	B2	C1,J1
R36	B2	C2,K2
R44	C2	C2,K2
R45	C2	C2,K2
R46	C2	C2,K2
R47	C2	C2,K2
R55	C2	D2,K2
R58	B2	D2,L2
R71	B2	E1
R72	B2	D1,L1
R73	B2	E1,L1
R74	B3	E2,M2
R76*	B2	L2
R78*	B3	M2
R81	B2	E1,M1
R84	B2	E2
R85	A3	E2
R85*	A2	M2
R86	A2	E2
R90	A2	F1,M1
R91	A2	F1,M1
R92	A2	F1,M1
R97	B3	F2
R97*	A2	M2
R98	A2	F2
TP12	A2	B1,J1
U58	C2	D2,L2
VR12	A1	B1,I1
VR47	B2	C2,K2
VR94	A2	F2,M2
ASSY A44		
C02	C4	D5
C03	C5	C5
C09	A4	D8
C11	D5	D5
C12	C4	D5
C22	C4	E5
C26	A4	E7
C27	A4	E8
C28	C4	E8
C29	A4	E9
C34	B4	E7
C39	B3	E9
C40	D5	F5
C42	C5	F5
C44	B5	F6
C46	A5	F7
C50	C5	F5
C54	A5	F6
C59	B3	F8
CR13	C4	D6
CR14	B4	E6
CR18	A4	D8
CR55	A5	F7
CR57	A5	F8
F05	A5	C7
F06	A5	D7
Q12	C4	D5
Q13	C5	E5
Q14	D5	E6
Q16	A4	D8
Q17	A5	E8
Q24	B4	E6
Q28	B3	E8
Q29	B3	E9
Q52	C5	F5
Q53	C5	F5
Q54	D5	F6
Q55	A5	F6
Q56	A5	F7
Q57	B5	F8
R02	C4	D5
R03	C4	D5
R04	C4	D5
R05	D4	D6
R06	D4	D6
R07	A4	D8
R08	A5	B8
R09	A5	B8
R13	C4	E5
R14	D5	E6
R15	A4	D7
R16	A4	D7
R17	A4	D8
R18	A4	D8
R19	A4	D8
R20	C5	E5
R22	C5	E5
R23	D5	E5
R24	B4	E6
R25	B5	E6
R26	B4	E7
R27	A5	E7
R28	A5	E8
R29	B3	E8
R30	C5	E5
R32	D5	E5
R33	D5	F5
R35	A5	E7
R36	A5	F7
R37	A3	E8
R38	B3	F8
R40	D3	F5
R42	C4	F5
R44	B5	F6
R46	A4	F7
R48	B3	F8
R49	B3	F8
R50	C5	F5
R53	D5	F6
R54	A5	F6
R56	A4	F7
S07	B3	B8
T21	D5	D4
TP07	A5	D8
TP29	B3	E9

*** Note applicable serial number ranges for earlier board versions.**

7

1



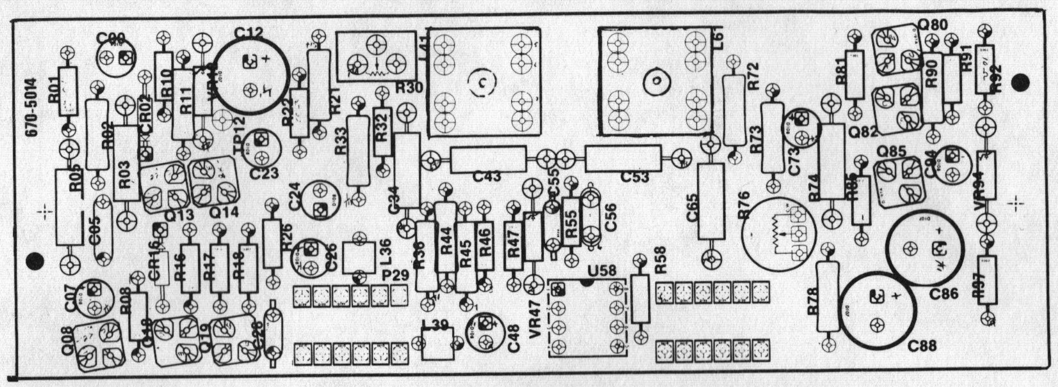


REV MAY 1982
2200-158

AUDIO OUTPUT 7

AUDIO OUTPUT
A43, A44 SN B010188-UP

A | B | C | D | E | F



A43 AUDIO DISCRIMINATOR BOARD
(SN B000100—B010187)

Audio Output ⟨7⟩

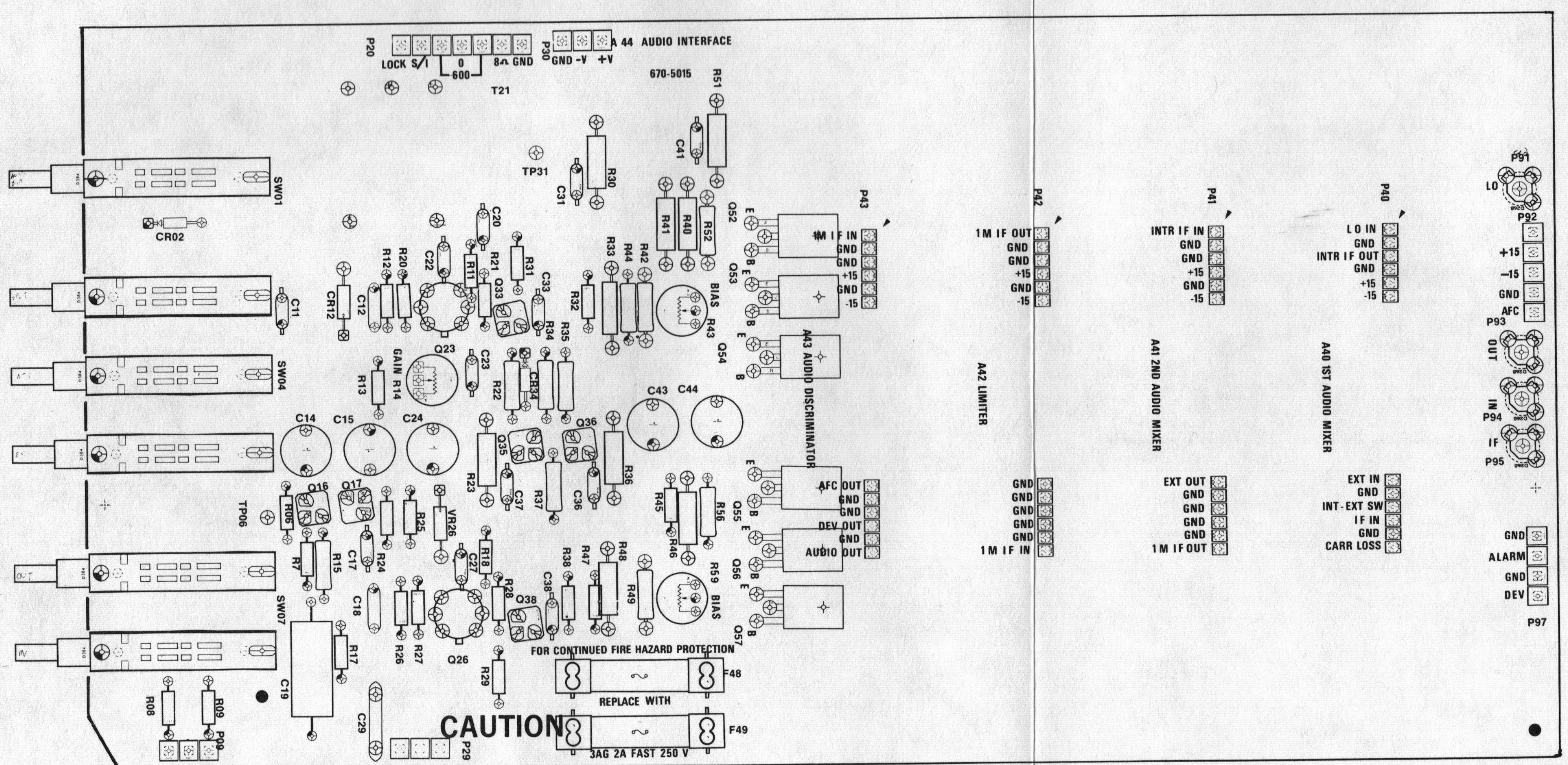
Circuit Number	Schematic Location	Board Location
ASSY A43		
C00	A1	A1
C05	B1	A2
C07	A1	A2
C12	A1	B1
C23	B1	B1
C24	B2	B2
C26	B1	B2
C28	B1	B2
C34	B2	C2
C43	B2	C2
C48	B1	C2
C53	B2	D2
C55	C2	C2
C56	C2	D2
C65	B2	D2
C73	A2	E1
C86	B3	E2
C88	A3	E2

Circuit Number	Schematic Location	Board Location
C94	A2	F2
CR02	A1	A1
CR16	A1	A2
L36	B1	C2
L39	B1	C2
L41	B2	C1
L61	B2	D1
Q08	B1	A2
Q13	B2	B2
Q14	B2	B2
Q18	B1	B2
Q19	B1	B2
Q80	A2	E1
Q82	A2	E1
Q85	A3	E2
R01	A1	A1
R02	B1	A1

Circuit Number	Schematic Location	Board Location
R03	A1	A2
R05	A1	A2
R08	B1	A2
R10	A1	B1
R11	A2	B1
R16	B1	B2
R17	B1	B2
R18	B1	B2
R21	B2	B1
R22	B2	B1
R26	B1	B2
R30	C1	C1
R32	C1	C1
R33	B2	B1
R36	B2	C2
R44	C2	C2
R45	C2	C2
R46	C2	C2
R47	C2	C2
R55	C2	D2

Circuit Number	Schema Locati
R58	B2
R72	B2
R73	B2
R74	B3
R76	B2
R78	B3
R81	B2
R85	A2
R90	A2
R91	A2
R92	A2
R97	A2
TP12	A2
U58	C2
VR12	A1
VR47	B2
VR94	A2

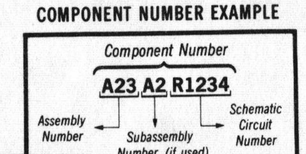
G | H | I | J | K | L | M | N | O | P



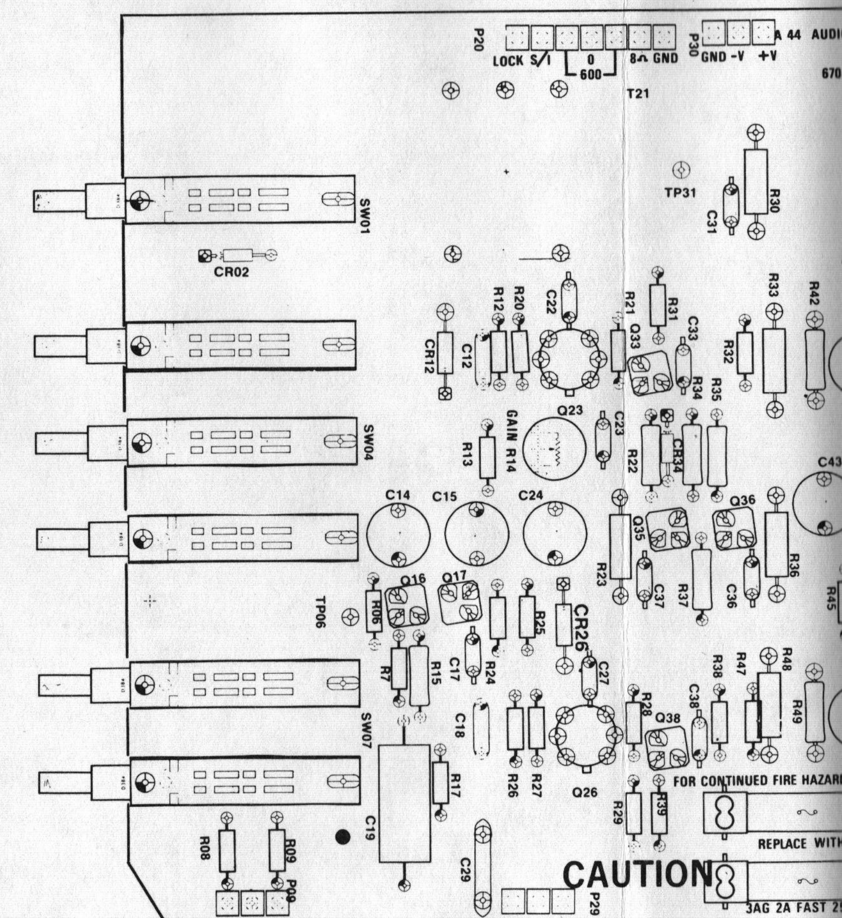
A44 AUDIO INTERFACE BOARD
(SN B010120—B010187)

Static Sensitive Devices
See Maintenance Section

COMPONENT NUMBER EXAMPLE



Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.



A44 AUDIO INTERFACE BOARD
(SN B000100—B000119)

@

Audio Output ⟨7⟩

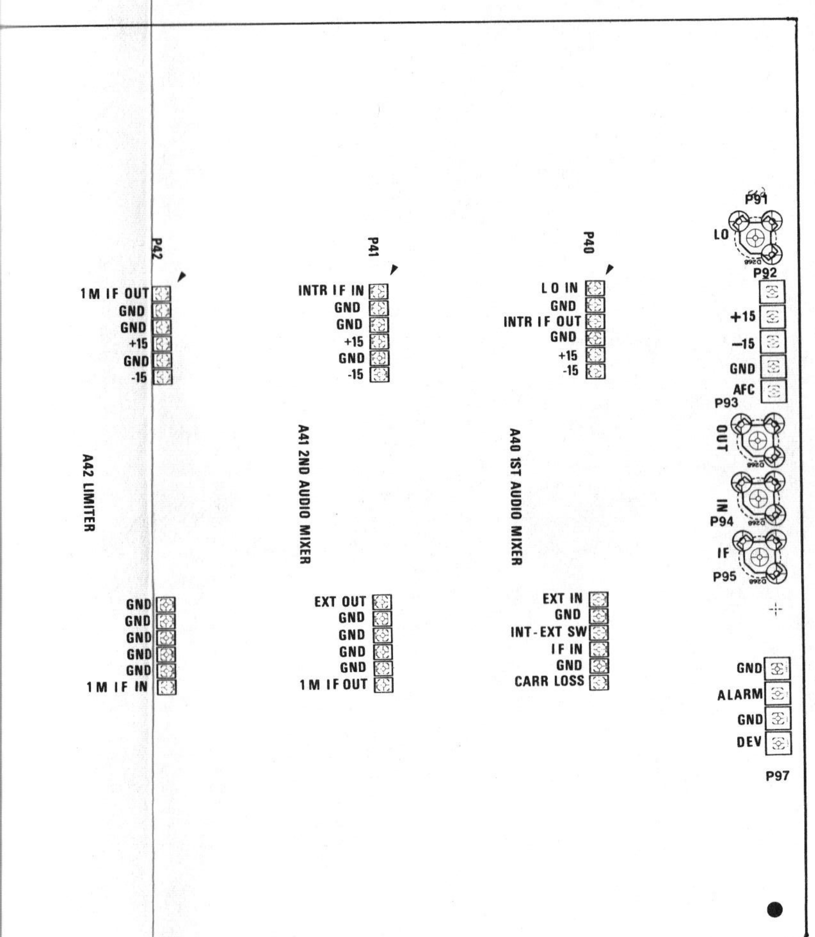
Circuit Number	Schematic Location	Board Location
ASSY A43		
C00	A1	A1
C05	B1	A2
C07	A1	A2
C12	A1	B1
C23	B1	B1
C24	B2	B2
C26	B1	B2
C28	B1	B2
C34	B2	C2
C43	B2	C2
C48	B1	C2
C53	B2	D2
C55	C2	C2
C56	C2	D2
C65	B2	D2
C73	A2	E1
C86	B3	E2
C88	A3	E2
C94	A2	F2
CR02	A1	A1
CR16	A1	A2
L36	B1	C2
L39	B1	C2
L41	B2	C1
L61	B2	D1
Q08	B1	A2
Q13	B2	B2
Q14	B2	B2
Q18	B1	B2
Q19	B1	B2
Q80	A2	E1
Q82	A2	E1
Q85	A3	E2
R01	A1	A1
R02	B1	A1
R03	A1	A2
R05	A1	A2
R08	B1	A2
R10	A1	B1
R11	A2	B1
R16	B1	B2
R17	B1	B2
R18	B1	B2
R21	B2	B1
R22	B2	B1
R26	B1	B2
R30	C1	C1
R32	C1	C1
R33	B2	B1
R36	B2	C2
R44	C2	C2
R45	C2	C2
R46	C2	C2
R47	C2	C2
R55	C2	D2
R58	B2	D2
R72	B2	D1
R73	B2	E1
R74	B3	E2
R76	B2	E2
R78	B3	E2
R81	B2	E2
R85	A2	E2
R90	A2	E1
R91	A2	F1
R92	A2	F1
R97	A2	F2
TP12	A2	B1
U58	C2	D2
VR12	A1	B1
VR47	B2	C2
VR94	A2	F2

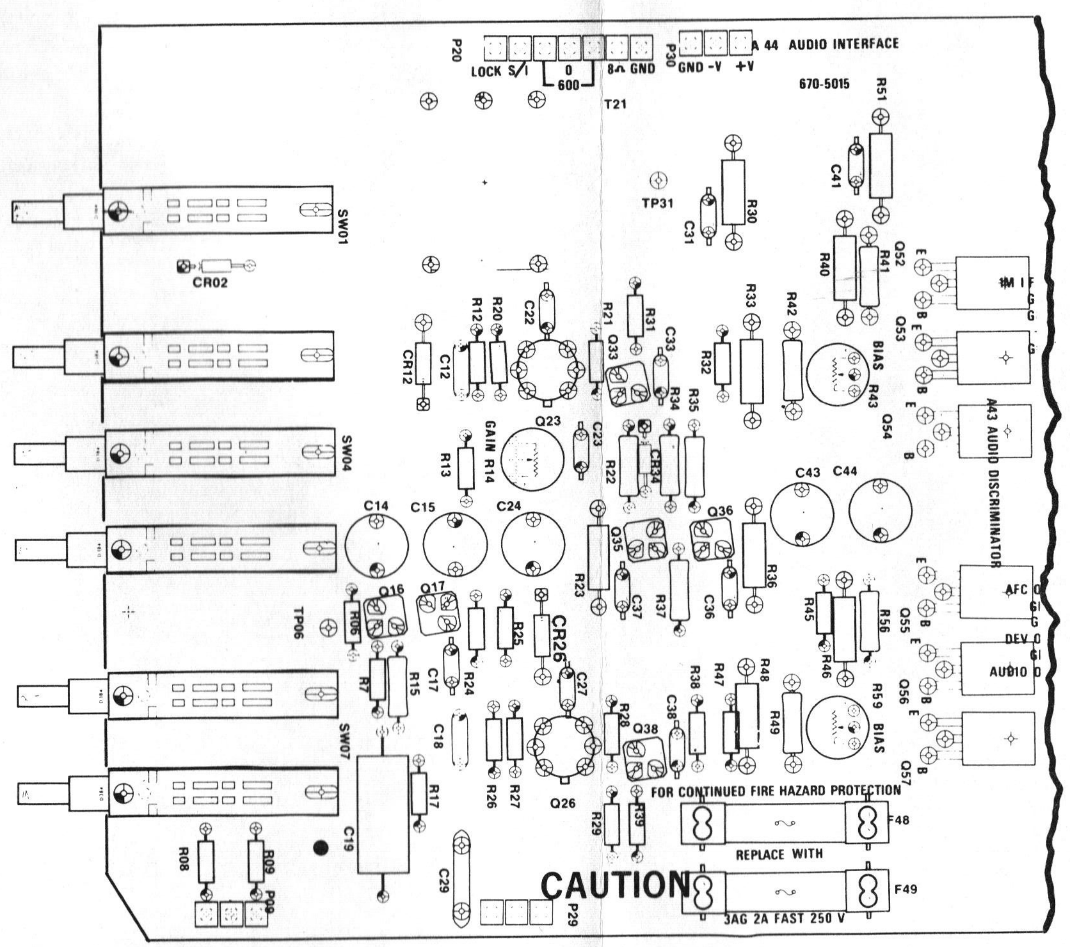
Audio Output ⟨7⟩

Circuit Number	Schematic Location	Board Location
ASSY A44		
C11	C5	B6
C12	C4	C6,N6
C14	B3	C7,N7
C15	D4	C7,N7
C17	A4	C7,N7
C18	A4	C8,N8
C19	B3	C8,N8
C20	D5	D5
C22	C4	D5
C22*	B4	O6
C23	C4	D6
C23*	B4	O6
C24	A4	C7,O7
C27	A4	D7,O7
C29	B3	C8,N8
C31	D5	D5,P5
C33	C4	D6
C33*	B4	O6
C36	A5	D7,P7
C37	B5	D7,O7
C38	A4	D8,O8
C41	C5	E5
C41*	B5	P5
C43	A5	E6,P6
C44	A5	E6,P6
CR12	C4	C6
CR12*	B4	N6
CR26	A4	D7,O7
CR34	C4	D6,O6
F48	A5	E8,P8
F49	A5	E8,P8
Q16	B3	C7,N7
Q17	B3	C7,N7
Q23	C4	D6
Q23*	B4	O6
Q26	A4	D8,O8
Q33	C5	D6
Q33*	B5	O6
Q35	D5	D7,O7
Q36	B5	D7,P7
Q38	A5	D8,O8
Q52	C5	E5
Q52*	B5	Q5
Q53	D5	E6
Q53*	C5	Q6
Q54	D5	E6,Q6
Q55	A5	E7,Q7
Q56	A5	E8,Q7
Q57	A5	E8,Q8
R06	B3	C7,N7
R07	B3	C7,N7
R08	A5	B8,M8
R09	A5	B8,M8
R11	C4	D6
R12	C4	C6,N6
R13	D4	C6,N6
R14	D4	C6,N6
R15	B3	C7,N7
R17	B3	C8,N8
R18	A4	D7
R20	C4	C6,N6
R21	C4	D6
R21*	B4	O6
R22	D5	D6,O6
R23	B5	D7,O7
R24	A3	C7,N7
R25	A4	C7,N7
R26	A4	C8,N8
R27	A4	C8,N8
R28	A4	D8,O8
R29	A4	D8,O8
R30	D5	E5,P5
R31		D6
R31*	B4	O6
R32	C5	D6
R32*	B5	P6
R33	D5	E6
R33*	C5	P6
R34	B4	D6,O6
R35	B5	D6
R36	A5	E7,P7
R37	B4	D7,O7
R38	A5	D8,P8
R39*	A5	O8
R40	C5	E5
R40*	B5	P5
R41	C5	E5
R41*	B5	P5
R42	D5	E6,P6
R43	D4	E6
R43*	C4	P6
R44	D5	E6
R45	A5	E7,P7
R46	A5	E7,P7
R47	A5	D8
R47*	A5	P7
R48	A5	E8
R48*	A5	P7
R49	A4	E8
R49*	A5	P8
R51	C5	E5
R51*	B5	P5
R52	C5	E5
R56	A5	E7,P7
R59	A4	E8,P8
S07	B3	B8,N8
T21	D5	C5
T21*	C5	N5
TP06	B3	B7,N7
TP31	A5	D5,O5

* Note applicable serial number ranges for earlier board versions.

G | H | I | J | K | L | M | N | O | P | Q





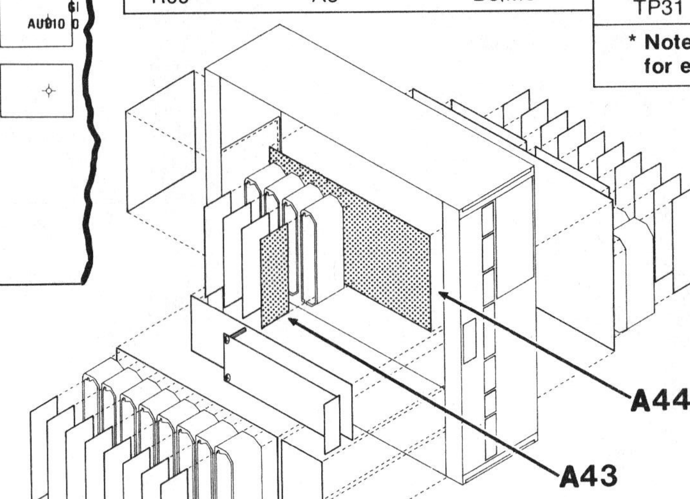
A44 AUDIO INTERFACE BOARD
(SN B000100—B000119)

Static Sensitive Devices
See Maintenance Section

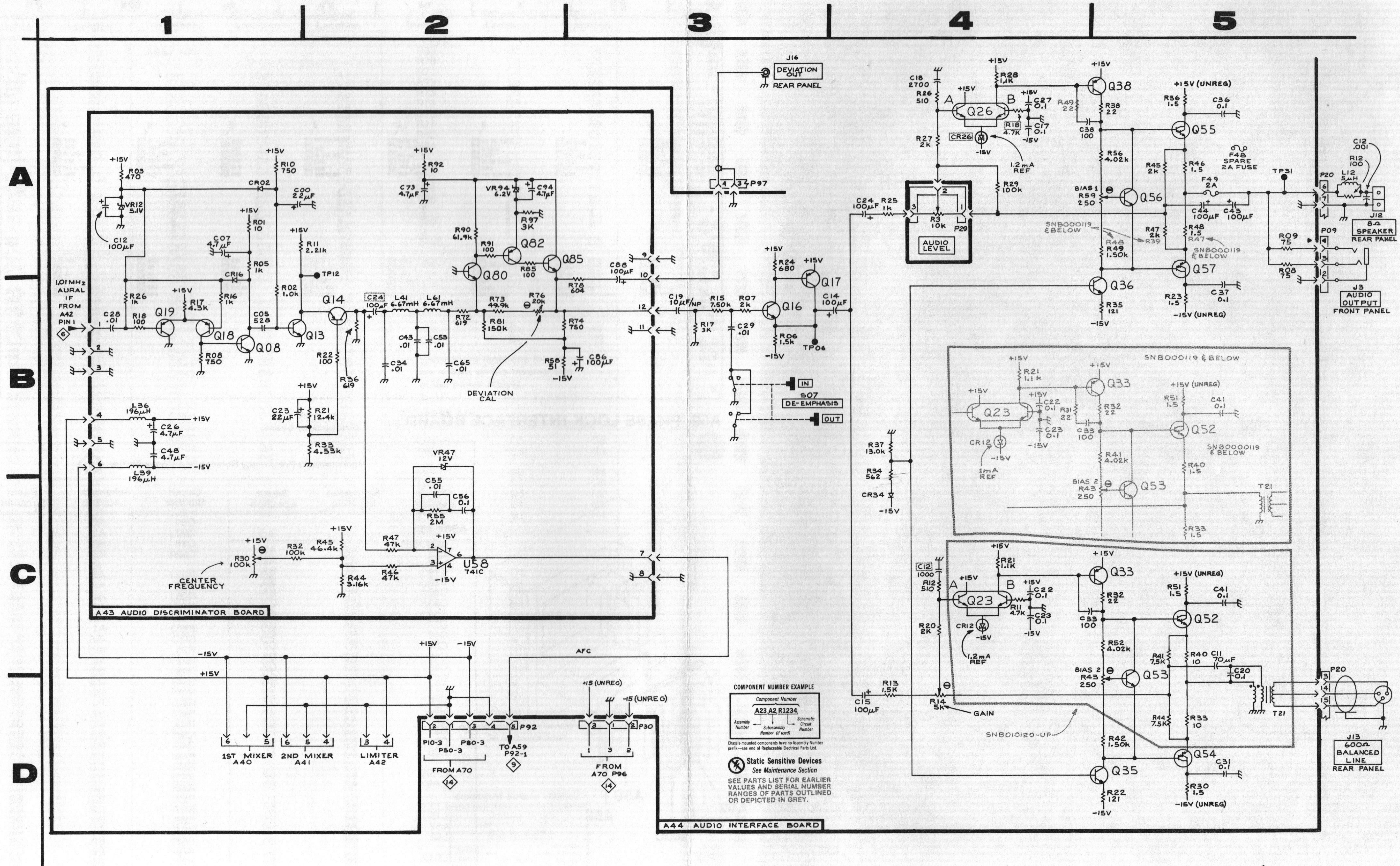
COMPONENT NUMBER EXAMPLE

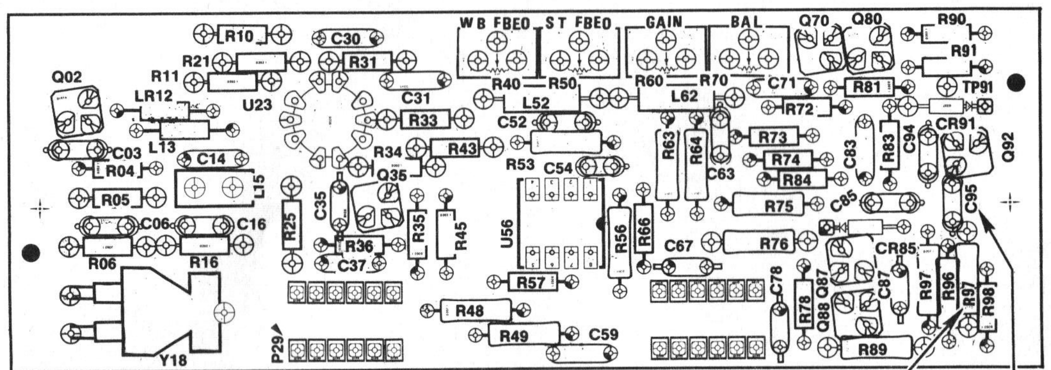
Component Number
A23 A2 R1234
Assembly Number — *Subassembly Number (if used)* — *Schematic Circuit Number*

Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.



2200-137

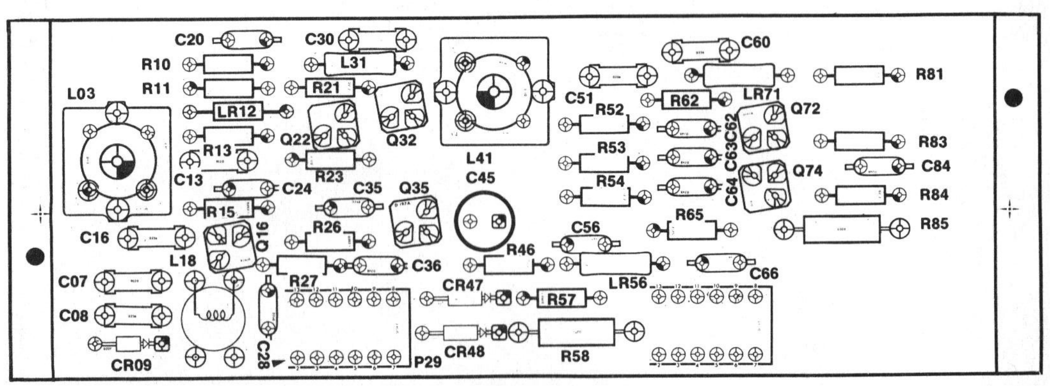

1
2
3
4
5
A
B
C
D
A43 AUDIO DISCRIMINATOR BOARD
A44 AUDIO INTERFACE BOARD
J16 DEVIATION OUT REAR PANEL
1.01MHz AURAL IF FROM A42 PIN 1
DEVIATION CAL
CENTER FREQUENCY
AUDIO LEVEL
S07 DE-EMPHASIS
IN
OUT
J12 8Ω SPEAKER REAR PANEL
J3 AUDIO OUTPUT FRONT PANEL
J13 600Ω BALANCED LINE REAR PANEL
F48 SPARE 2A FUSE
GAIN
SNB000119 & BELOW
SNB010120-UP
1ST MIXER A40
2ND MIXER A41
LIMITER A42
FROM A70
TO A59 P92-1
FROM A70 P96
AFC
COMPONENT NUMBER EXAMPLE
Static Sensitive Devices
See Maintenance Section
SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES OF PARTS OUTLINED OR DEPICTED IN GREY.



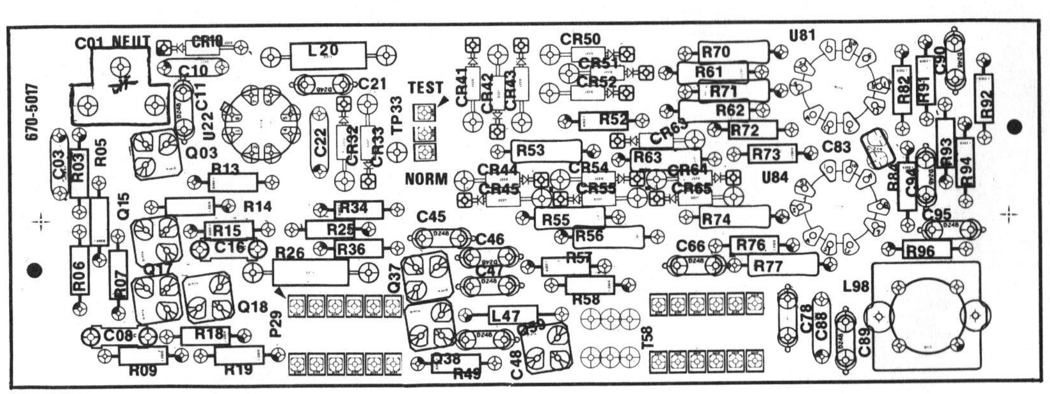
A50 REFERENCE CONTROL BOARD

R99 (Added at SN B010120)

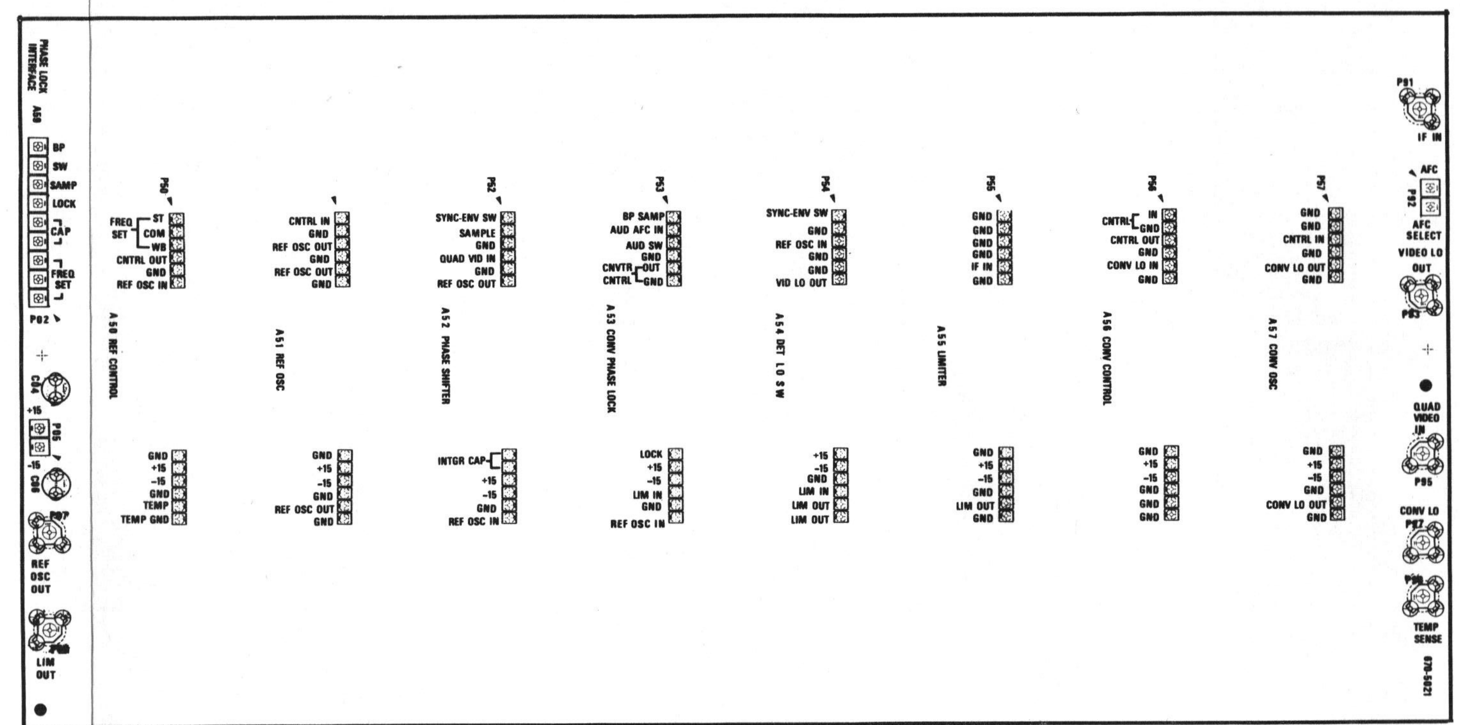
C95 Moved to this position at SN B010120



A51 REFERENCE OSCILLATOR BOARD

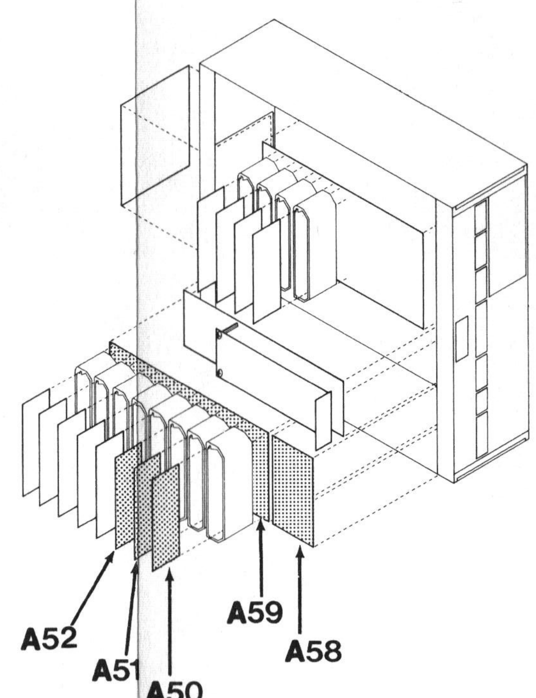


A52 PHASE SHIFTER BOARD



A59 PHASE LOCK INTERFACE BOARD

C55, C56, C57 (On back of board)



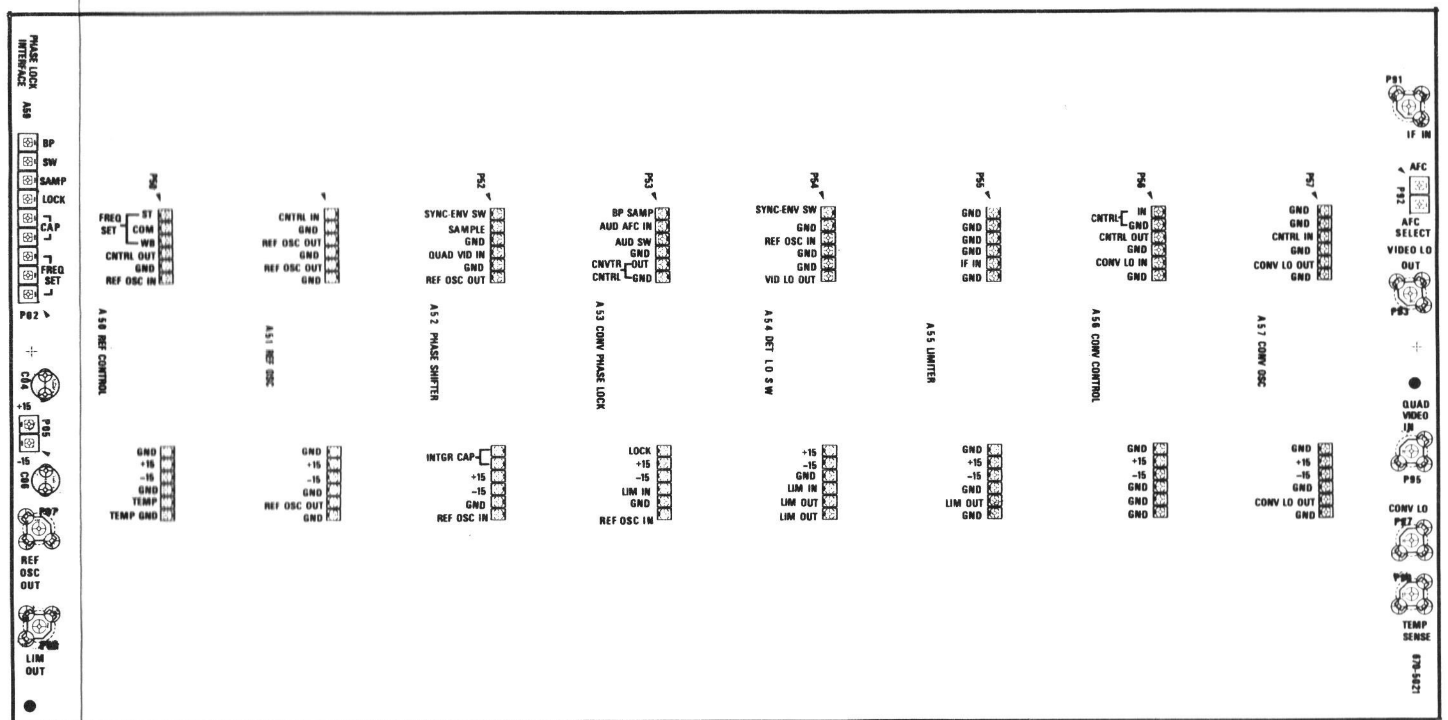
Intermediate Frequency Reference & Phase Shifter ⟨8⟩

Circuit Number	Schematic Location	Board Location
ASSY A50		
C03	A2	A2
C06	A2	A2
C14	A1	B2
C16	A2	B2
C30	B2	B1
C31	A2	C1
C35	B2	B2
C37	B2	B2
C52	B2	C2
C54	B3	D2
C59	B3	D3
C63	B2	D2
C67	A3	D2
C71	A2	E1
C78	B3	E3
C83	A3	E2
C85	A3	E2
C87	A3	E3
C94	B3	E2
C95	A3	F2
CR85	A3	E2
CR91	A3	F2
L13	A2	A2
L15	A1	B2
L52	A2	C2
L62	A2	D1
LR12	A2	A2
Q02	A2	A1
Q35	B2	C2
Q70	A3	E1

Circuit Number	Schematic Location	Board Location
Q80	A3	E1
Q87	A3	E3
Q88	B3	E3
Q92	B3	F2
R04	A2	A2
R05	A2	A2
R06	A1	A2
R10	A2	B1
R11	A2	A2
R16	A1	B2
R21	A2	B1
R25	A2	B2
R31	A2	B1
R33	B2	C2
R34	B2	C2
R35	B2	C2
R36	B2	B2
R40	B2	C1
R43	B2	C2
R45	B2	C2
R48	B3	C3
R49	B3	C3
R50	B2	D1
R53	B3	C2
R56	B3	D2
R57	B3	C3
R60	B3	D1
R63	B3	D2
R64	B3	D2
R66	B2	D2
R70	B2	D1
R72	A3	E2
R73	A3	E2
R74	A3	E2
R75	B2	E2
R76	B3	E2

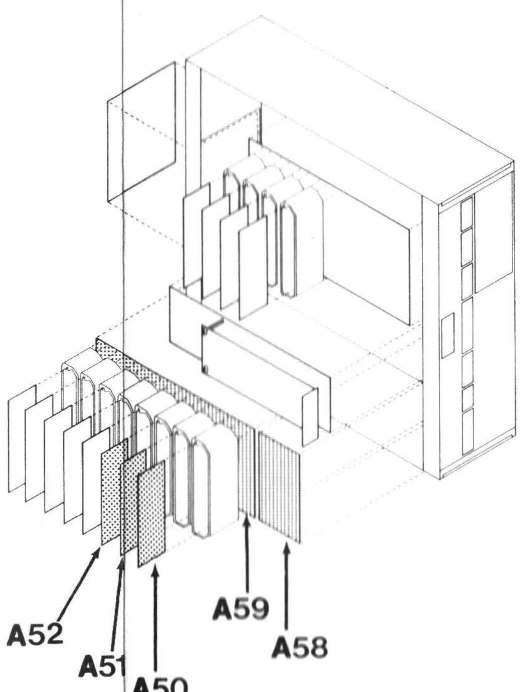
Circuit Number	Schematic Location
R78	A3
R81	A3
R83	A3
R84	A3
R89	B3
R90	A3
R91	A3
R96	B3
R97	A3
R98	A3
R99	A3
TP91	
U23	A2
U56A	B3
U56B	B3
Y18	A1
ASSY A51	
C07	A4
C08	A4
C13	B4
C16	B4
C20	A4
C24	B4
C28	A4
C30	A4
C35	B4
C36	A4
C45	B4
C51	A5
C56	B4
C60	A5
C62	A5
C63	B5
C64	A5
C66	B4
C84	A5
CR09	A4
CR47	B5
CR48	B5
L03	A4
L18	A4
L31	A4
L41	A5
LR12	A4
LR56	B4
LR71	A5
Q16	B4
Q22	A4
Q32	A4
Q35	B4
Q72	A5
Q74	A5
R10	A4
R11	A4
R13	B4
R15	B4
R21	A4
R23	B4
R26	B4
R27	A4
R46	B4
R52	A5
R53	A5
R54	B5
R57	B5
R58	B5
R62	A5
R65	A5
R81	A5
R83	A5
R84	A5
R85	A5

G H I J K L M N



A59 PHASE LOCK INTERFACE BOARD

C55, C56, C57
(On back of board)



Intermediate Frequency Reference & Phase Shifter ⟨8⟩

Circuit Number	Schematic Location	Board Location
ASSY A50		
C03	A2	A2
C06	A2	A2
C14	A1	B2
C16	A2	B2
C30	B2	B1
C31	A2	C1
C35	B2	B2
C37	B2	B2
C52	B2	C2
C54	B3	D2
C59	B3	D3
C63	B2	D2
C67	A3	D2
C71	A2	E1
C78	B3	E3
C83	A3	E2
C85	A3	E2
C87	A3	E3
C94	B3	E2
C95	A3	F2
CR85	A3	E2
CR91	A3	F2
L13	A2	A2
L15	A1	B2
L52	A2	C2
L62	A2	D1
LR12	A2	A2
Q02	A2	A1
Q35	B2	C2
Q70	A3	E1
Q80	A3	E1
Q87	A3	E3
Q88	B3	E3
Q92	B3	F2
R04	A2	A2
R05	A2	A2
R06	A1	A2
R10	A2	B1
R11	A2	A2
R16	A1	B2
R21	A2	B1
R25	A2	B2
R31	A2	B1
R33	B2	C2
R34	B2	C2
R35	B2	C2
R36	B2	B2
R40	B2	C1
R43	B2	C2
R45	B2	C2
R48	B3	C3
R49	B3	C3
R50	B2	D1
R53	B3	C2
R56	B3	D2
R57	B3	C3
R60	B3	D1
R63	B3	D2
R64	B3	D2
R66	B2	D2
R70	B2	D1
R72	A3	E2
R73	A3	E2
R74	A3	E2
R75	B2	E2
R76	B3	E2

Intermediate Frequency Reference & Phase Shifter ⟨8⟩

Circuit Number	Schematic Location	Board Location
R78	A3	E3
R81	A3	E1
R83	A3	E2
R84	A3	E2
R89	B3	E3
R90	A3	F1
R91	A3	F1
R96	B3	F3
R97	A3	E3
R98	A3	F3
R99	A3	F3
TP91		F1
U23	A2	B2
U56A	B3	C2
U56B	B3	C2
Y18	A1	A3
ASSY A51		
C07	A4	A6
C08	A4	A6
C13	B4	B5
C16	B4	A5
C20	A4	B4
C24	B4	B5
C28	A4	B6
C30	A4	B4
C35	B4	B5
C36	A4	C6
C45	B4	C5
C51	A5	D5
C56	B4	D5
C60	A5	D4
C62	A5	D5
C63	B5	D5
C64	A5	D5
C66	B4	D6
C84	A5	E5
CR09	A4	A6
CR47	B5	C6
CR48	B5	C6
L03	A4	A5
L18	A4	B6
L31	A4	B4
L41	A5	C5
LR12	A4	B5
LR56	B4	D6
LR71	A5	E5
Q16	B4	B5
Q22	A4	B5
Q32	A4	C5
Q35	B4	C5
Q72	A5	E5
Q74	A5	E5
R10	A4	B4
R11	A4	B5
R13	B4	B5
R15	B4	B5
R21	A4	B5
R23	B4	B5
R26	B4	B5
R27	A4	B6
R46	B4	C5
R52	A5	D5
R53	A5	D5
R54	B5	D5
R57	B5	D6
R58	B5	D5
R62	A5	D5
R65	A5	D5
R81	A5	E5
R83	A5	E5
R84	A5	E5
R85	A5	E5
ASSY A52		
C01	C2	A8
C03	C2	A8
C08	C1	A9
C10	C2	B8
C11	C2	B8
C16	C2	B9
C21	D2	B8
C22	D2	B8
C45	D4	C8
C46	C4	C8
C47	D4	C9
C48	C5	C9
C66	D1	D9
C78	C4	E9
C83	C3	E8
C88	C1	E9
C89	C3	E9
C90	C3	F8
C94	C3	E8
C95	C3	F8
CR10	C2	B8
CR32	D2	B8
CR33	D2	B8
CR41	C3	C8
CR42	C3	C8
CR43	C3	C8
CR44	D3	C8
CR45	D3	C8
CR50	C3	D8
CR51	C3	D8
CR52	C3	D8
CR54	D3	D8
CR55	D3	D8
CR63	C3	D8
CR64	D3	D8
CR65	D3	D8
E37	D4	C9
L20	C2	B8
L98	C3	E9
LR47	C4	C9
P34	D3	C8
Q03	C2	B8
Q15	C2	A8
Q17	C2	A9
Q18	C2	B9
Q37	C4	C9
Q38	C4	C9
Q59	C4	C9
R03	C2	A8
R05	C1	A8
R06	C2	A9
R07	C2	A9
R09	C1	A9
R13	C2	B8
R14	C2	B8
R15	C2	B8
R18	C1	B9
R19	C1	B9
R25	C4	B8
R26	C4	B9
R34	D4	B8
R36	D4	B9
R49	C5	C9
R52	C3	D8
R53	C3	C8
R55	D3	C8
R56	D3	D9
R57	C4	D9
R58	C4	D9
R61	C3	D8
R62	C3	D8
R63	D3	D8
R70	C3	D8
R71	C3	D8
R72	C3	D8
R73	D3	E8
R74	D3	D8
R76	D3	D9
R77	D3	E9
R82	C3	E8
R84	D3	E8
R91	C3	E8
R92	C3	F8
R93	C3	F8
R94	C3	F8
R96	D3	E9
T58	C4	D9
TP33	D2	C8
U22	D2	B8
U81	C3	E8
U84	D3	E8
P/O ASSY A58		
S22	C1	A2
S25	B1	D2

Component locations for A58 are shown on the reverse side of the power supply.

Circuit Number	Schematic Location	Board Location
P/O ASSY A59		
C04	C5	G3
C06	C5	G3
P07	B5	G4
P08	D5	G4
P93	D5	N2
P95	C1	N3
P98	B1	N4
CHASSIS		
C01	D1	
C02	D1	
C03	D1	
C04	D1	
C05	D1	

Static Sensitive Devices
See Maintenance Section

COMPONENT NUMBER EXAMPLE

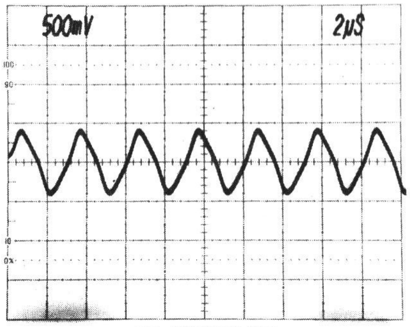
Component Number
A23 A2 R1234
Assembly Number — *Subassembly Number (if used)* — *Schematic Circuit Number*

Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

2200-138

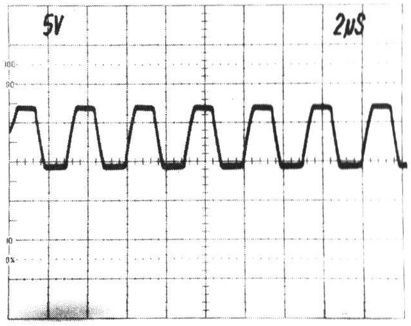
8

1



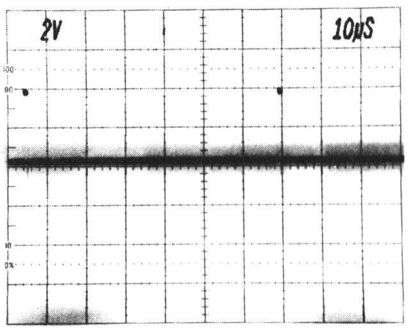
AC COUPLED

2



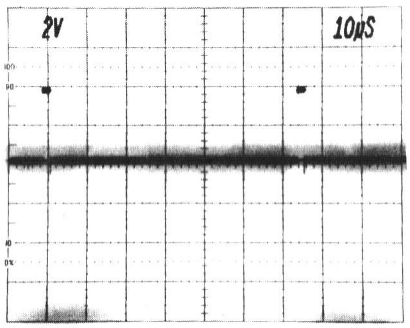
0 V

3



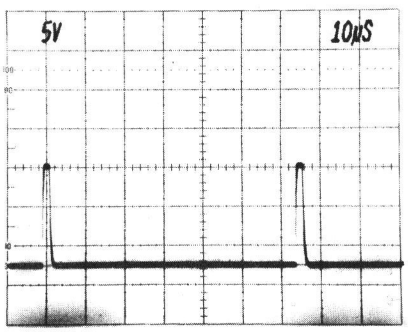
0 V

4



0 V

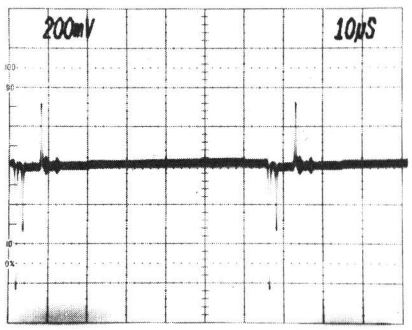
5



0 V

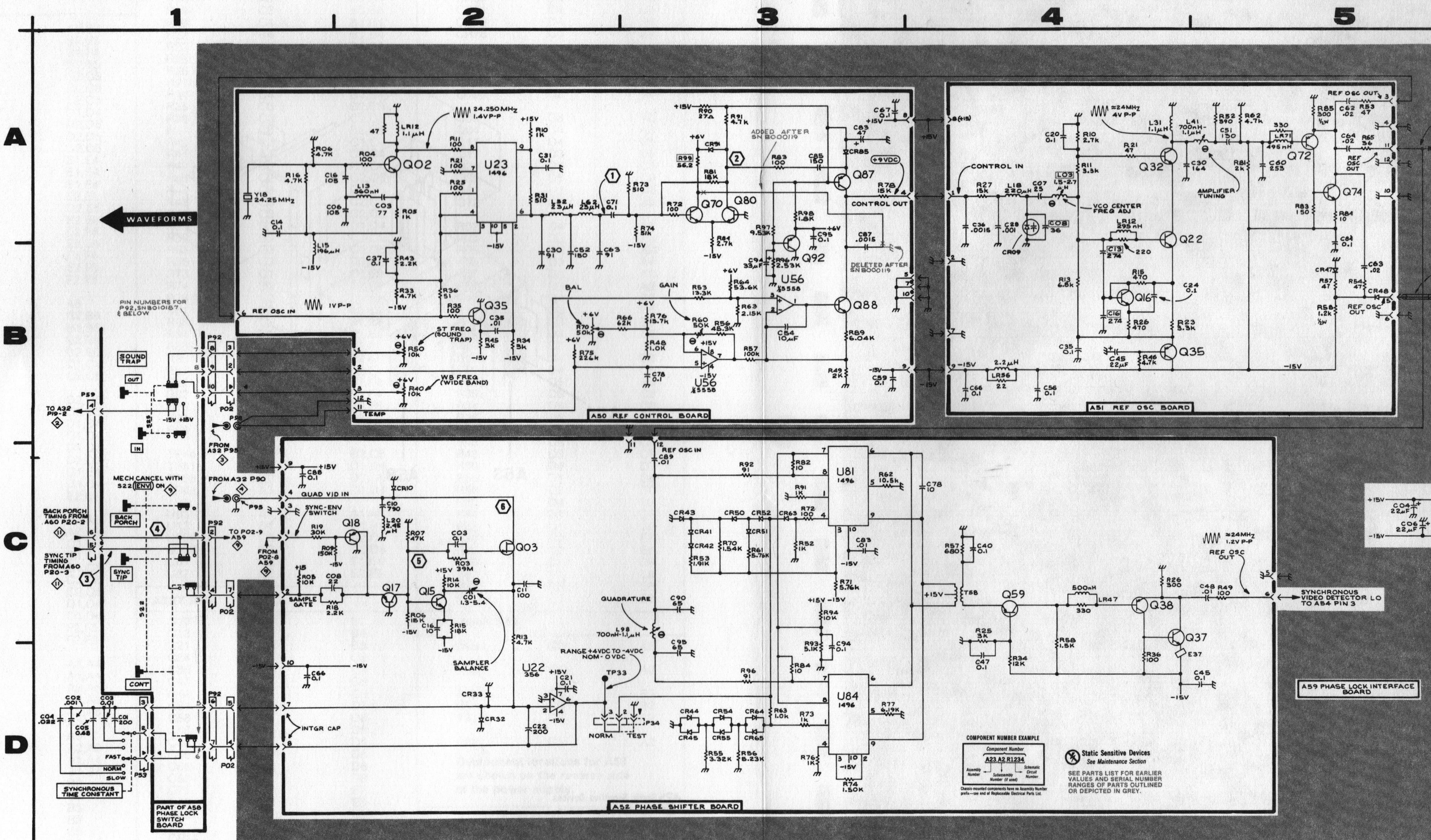
BACK PORCH SYNCHRONOUS DETECTION

6



0 V

BACK PORCH SYNCHRONOUS DETECTION



1450-1

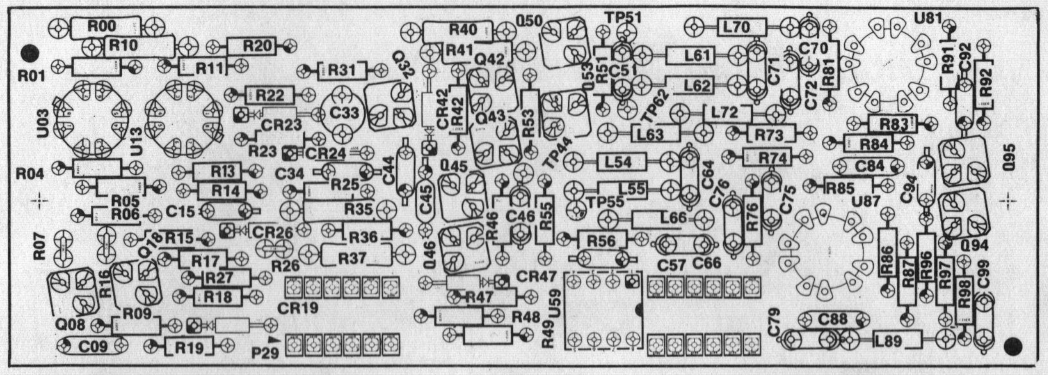
@ 2200-160

INTERMEDIATE FREQUENCY REFERENCE & PHASE SHIFTER ⟨8⟩

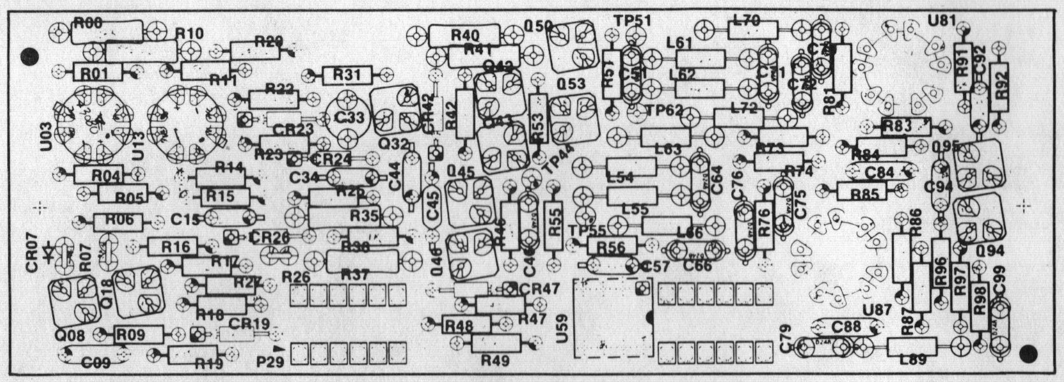
IF REF & PHASE SHIFTER A50, A51, A52, A58, A59 ⟨8⟩

COMPONENT LOCATIONS A53, A54

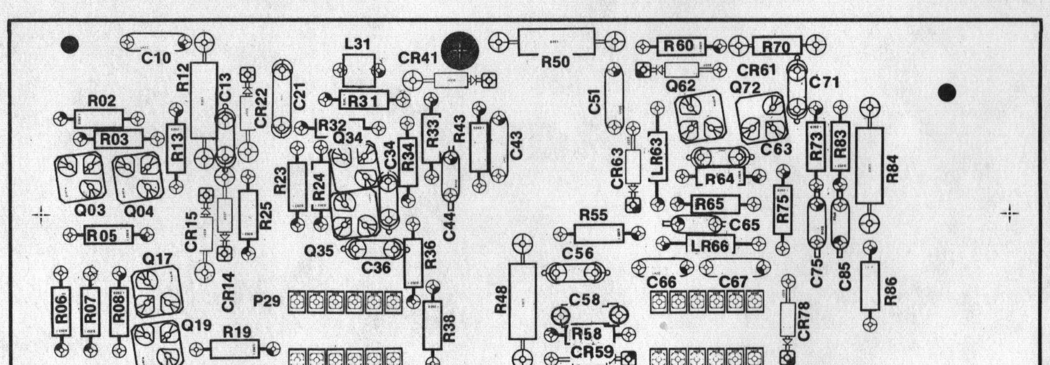
A B C D E F



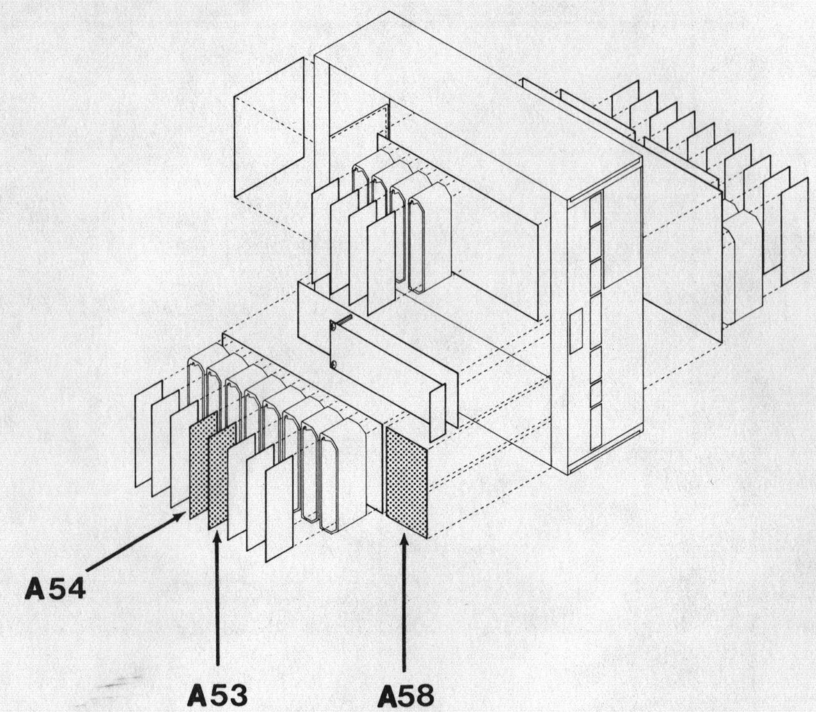
A53 CONVERTER PHASE LOCK BOARD
(SN B010120—UP)



A53 CONVERTER PHASE LOCK BOARD
(SN B000100—B000119)

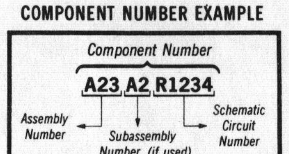


A54 DETECTOR-LO SWITCH BOARD



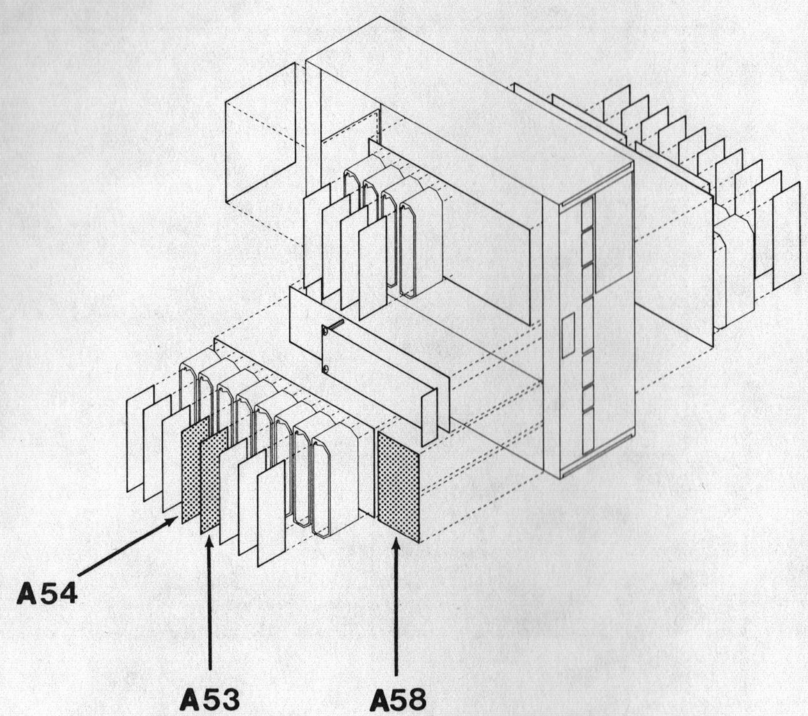
Static Sensitive Devices
See Maintenance Section

COMPONENT NUMBER EXAMPLE



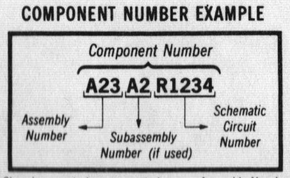
Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

Circuit Number	Schematic Location
ASSY A53	
C09	A3
C15	C3
C33	C4
C34	C3
C44	C4
C45	C4
C46	C2
C51	B3
C57	C3
C64	C2
C66	B1
C70	B2
C71	B2
C72	A2
C75	C2
C76	C2
C79	C1
C84	B1
C88	A1
C92	B2
C94	C2
C99	C1
CR07*	A3
CR19	A3
CR23	C4
CR24	C3
CR26	C3
CR42	C4
CR47	C3
L54	C2
L55	C2
L61	B2
L62	A3
L63	C2
L66	C2
L70	B2
L72	A2
L89	C1
Q08	A3
Q18	A4
Q32	C4
Q42	C4
Q43	B3
Q45	C3
Q46	C3
Q50	B3
Q53	A3
Q94	C2
Q95	B2
R00	B3
R01	A1
R04	A1
R05	A1
R06	A1
R07	A3
R07*	A3
R09	A4
R10	B4
R11	B4
R13	C3
R14	C3
R14*	C3
R15	A1
R15*	C3
R16	A3
R16*	A1
R17	A3



Static Sensitive Devices
See Maintenance Section

COMPONENT NUMBER EXAMPLE



Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

Converter Phase Lock & Detector LO Switch ⟨9⟩

Circuit Number	Schematic Location	Board Location
ASSY A53		
C09	A3	A3,A6
C15	C3	B2,B5
C33	C4	B1,B4
C34	C3	B2,B5
C44	C4	C2,C5
C45	C4	C2,C5
C46	C2	C2,C5
C51	B3	D1,D4
C57	C3	D2,D5
C64	C2	D2,D5
C66	B1	D2,D5
C70	B2	E1,E4
C71	B2	E1,E4
C72	A2	E1,E4
C75	C2	E2,E5
C76	C2	D2,E5
C79	C1	E2,E6
C84	B1	E2,E5
C88	A1	E2,E6
C92	B2	F1,F4
C94	C2	E2,F5
C99	C1	F2,F5
CR07*	A3	A5
CR19	A3	B2,B6
CR23	C4	B1,B5
CR24	C3	B2,B5
CR26	C3	B2,B5
CR42	C4	C1,C4
CR47	C3	C2,C5
L54	C2	D2,D5
L55	C2	D2,D5
L61	B2	D1,D4
L62	A3	D1,D4
L63	C2	D1,D5
L66	C2	D2,D5
L70	B2	D1,E4
L72	A2	D1,D4
L89	C1	E2,E6
Q08	A3	A2,A5
Q18	A4	A2,A5
Q32	C4	C1,C4
Q42	C4	C1,C4
Q43	B3	C1,C5
Q45	C3	C2,C5
Q46	C3	C2,C5
Q50	B3	D1,D4
Q53	A3	D1,D4
Q94	C2	F2,F5
Q95	B2	F2,F5
R00	B3	A1,A4
R01	A1	A1,A4
R04	A1	A2,A5
R05	A1	A2,A5
R06	A1	A2,A5
R07	A3	A2
R07*	A3	A5
R09	A4	A2,A6
R10	B4	A1,A4
R11	B4	B1,B4
R13	C3	B2
R14	C3	B2
R14*	C3	B5
R15	A1	B2
R15*	C3	B5
R16	A3	A2
R16*	A1	B5
R17	A3	B2,B5
R18	A3	B2,B5
R19	C3	B3,B6
R20	C4	B1,B4
R22	B4	B1,B4
R23	C4	B1,B5
R25	B3	B2,B5
R26	A3	B2,B5
R27	A1	B2,B5
R31	C4	B1,B4
R35	C3	B2,C5
R36	C3	C2,C5
R37	C3	B2,C5
R40	A3	C1,C4
R41	A4	C1,C4
R42	B3	C1,C4
R46	C2	C2,C5
R47	C3	C2,C5
R48	C3	C2,C6
R49	C3	C2,C6
R51	B3	D1,D4
R53	B3	C1,C5
R55	C3	C2,D5
R56	C3	D2,D5
R73	C1	E1,E5
R74	B1	E2,E5
R76	C2	E2,E5
R81	B2	E1,E4
R83	C2	E1,E5
R84	B2	E1,E5
R85	C1	E2,E5
R86	B1	E2,E5
R87	C2	E2,E5
R91	B2	F1,F4
R92	B2	F1,F4
R96	C2	E2,F5
R97	C1	F2,F5
R98	C1	F2,F5
TP44	C2	D2,C5
TP51	B3	D1,D4
TP55	C3	D2,D5
TP62	A3	D1,D4
U03	A1	A1,A5
U13	B4	B1,B5
U59A	C3	D2,D5
U59B	C3	D2,D5
U81	B2	E1,E4
U87	C2	E2,E5
ASSY A54		
C10	D4	B7
C13	D4	B8
C21	D4	B8
C34	D5	C8
C36	D5	C8
C43	D4	C8
C44	D5	C8
C51	D4	D7
C56	D1	D8
C58	D3	D9
C63	D1	D8
C65	D1	D8
C66	D2	D8
C67	D1	D8
C71	D2	E7
C75	D3	E8
C85	D1	E8
CR14	D4	B8
CR15	D4	B8
CR22	D4	B8
CR41	D4	C7
CR59	D3	D9
CR61	D4	D7
CR63	D4	D8
CR78	D3	E9
L31	D4	C7
LR63	D1	D8
LR66	D2	D8
Q03	D3	A8
Q04	D4	A8
Q17	D4	B8
Q19	D3	B9
Q34	D5	C8
Q35	D5	C8
Q62	D1	D8
Q72	D1	E8
R02	D4	A8
R03	D3	A8
R05	D4	A8
R06	D3	A9
R07	D3	A9
R08	D3	A9
R12	D4	B7
R13	D3	B8
R19	D3	B9
R23	D4	B8
R24	D5	B8
R25	D4	B8
R31	D4	C8
R32	D5	B8
R33	D5	C8
R34	D5	C8
R36	D5	C8
R38	D5	C9
R43	D5	C8
R48	D3	C9
R50	D4	D7
R55	D1	D8
R58	D3	D9
R60	D4	D7
R64	D1	D8
R65	D1	D8
R70	D2	E7
R73	D2	E8
R75	D1	E8
R83	D1	E8
R84	D1	E8
R86	D1	E8
P/O ASSY A58		
CR51	C5	A2
P60	C5	A2
R52	C5	B2
R53	C5	B2
R61	C5	A2
S22	C5	A2

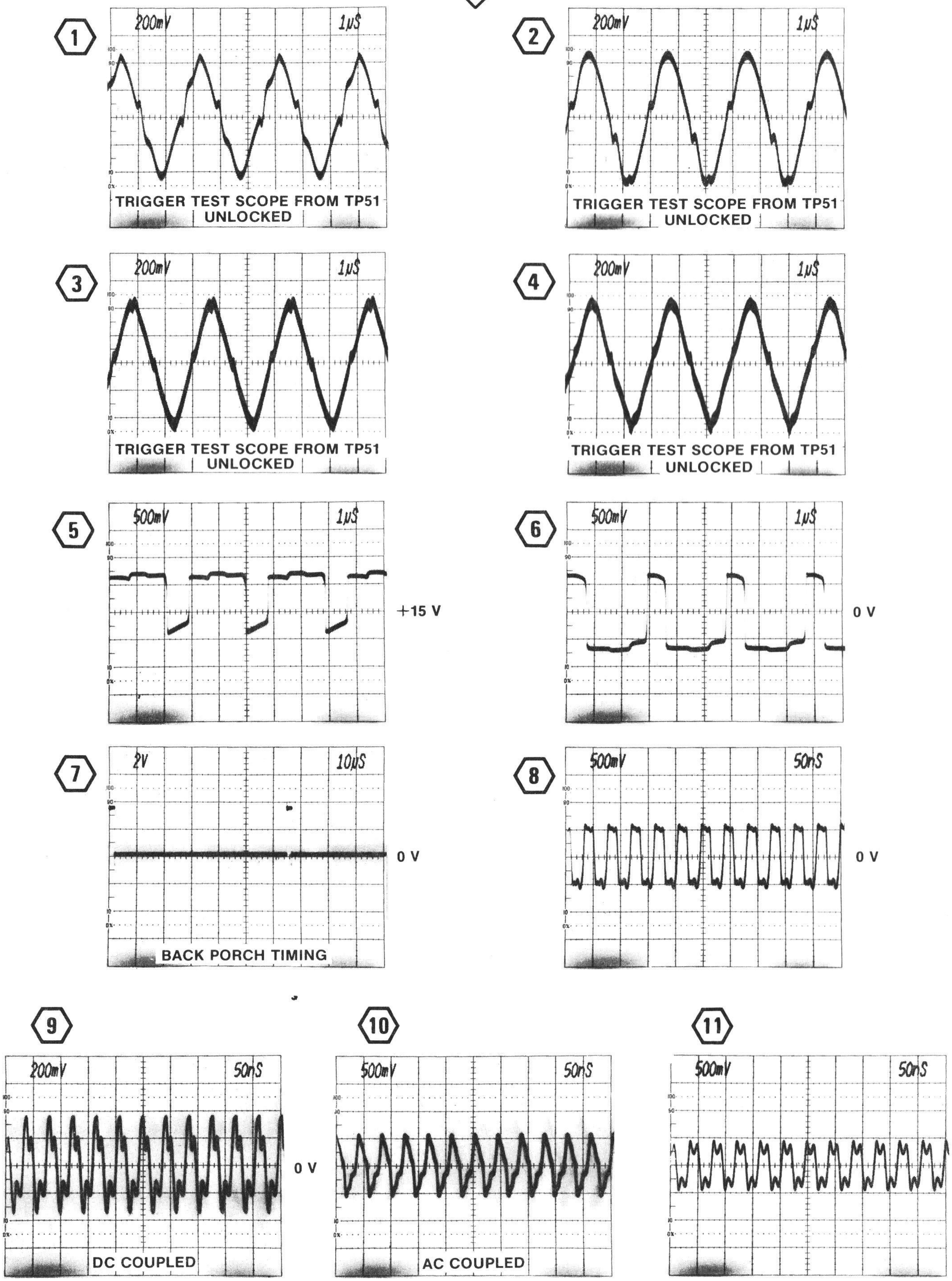
Component locations for A58 are shown on the reverse side of the power supply.

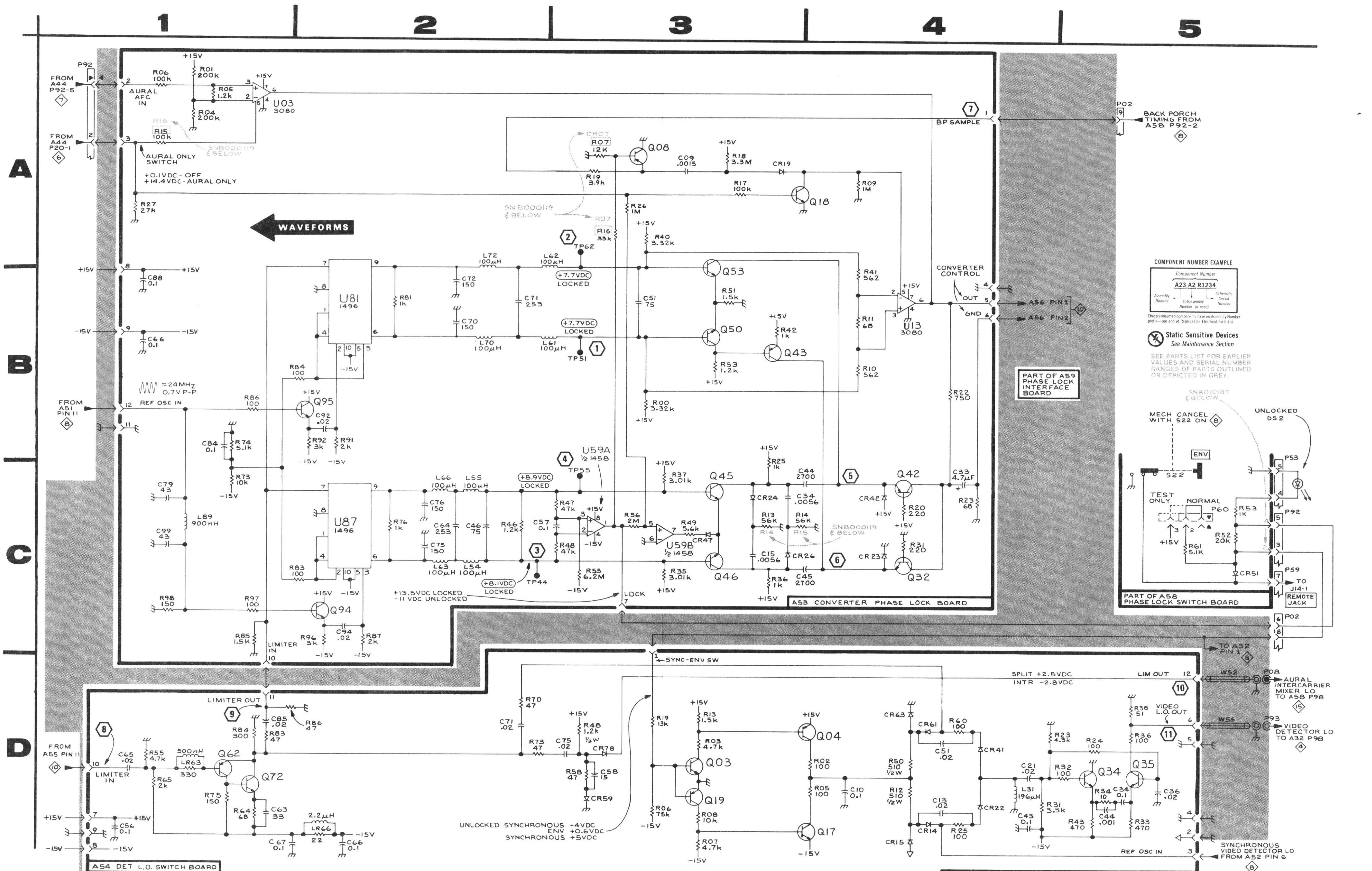
Circuit Number	Schematic Location	Board Location
CHASSIS		
DS2	B5	

*** Note applicable serial number ranges for earlier board versions.**

2200-139

9


1
200mV
1µS
TRIGGER TEST SCOPE FROM TP51
UNLOCKED
2
200mV
1µS
TRIGGER TEST SCOPE FROM TP51
UNLOCKED
3
200mV
1µS
TRIGGER TEST SCOPE FROM TP51
UNLOCKED
4
200mV
1µS
TRIGGER TEST SCOPE FROM TP51
UNLOCKED
5
500mV
1µS
+15 V
6
500mV
1µS
0 V
7
2V
10µS
0 V
BACK PORCH TIMING
8
500mV
50nS
0 V
9
200mV
50nS
0 V
DC COUPLED
10
500mV
50nS
AC COUPLED
11
500mV
50nS
0 V

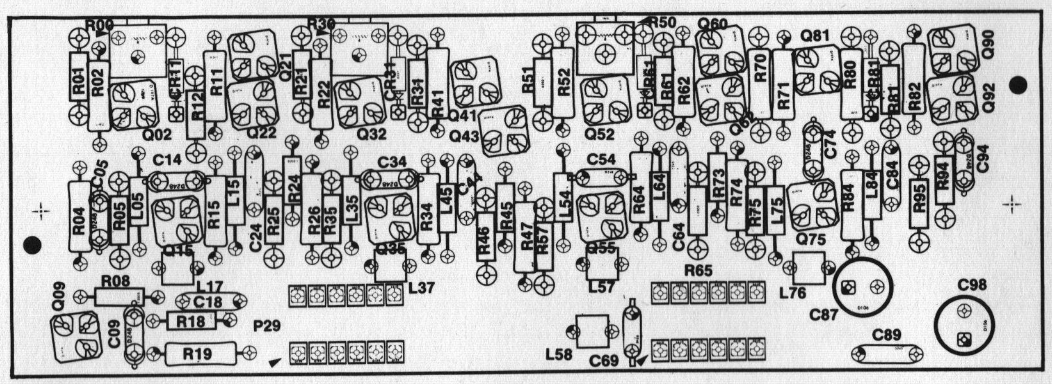


1450-1

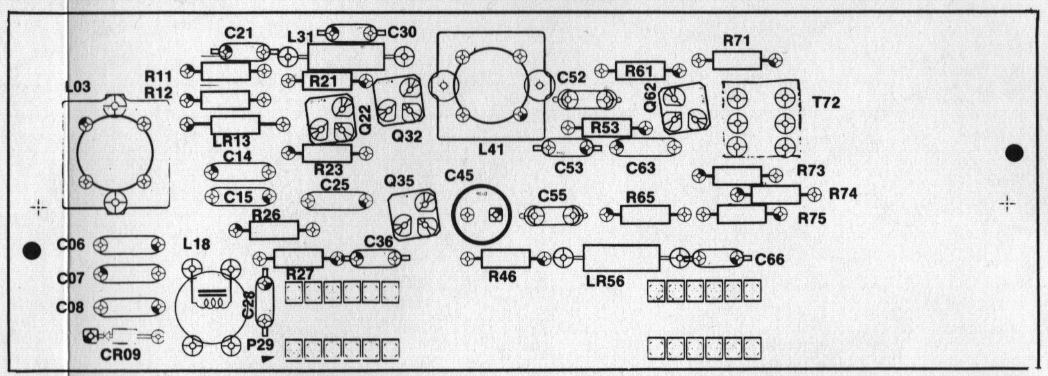
2200-161

CONVERTER PHASE LOCK & DETECTOR LO SWITCH 9

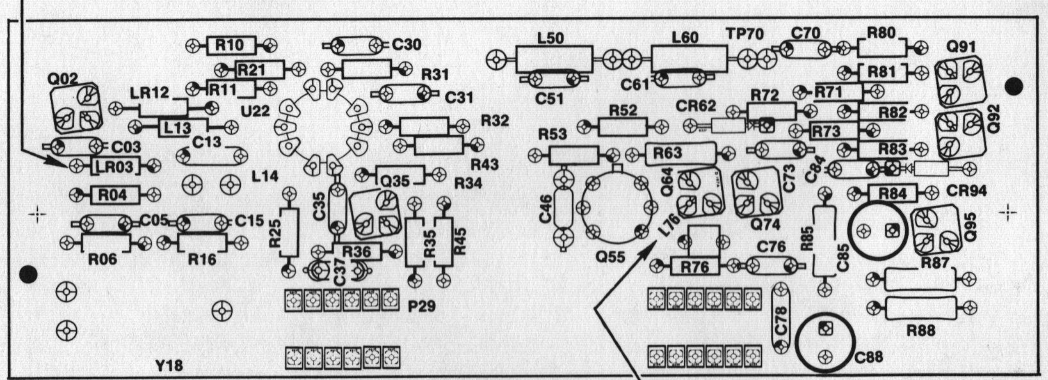
CONV. PHASE LOCK & DET. LO SWITCH A53, A54, A58 9



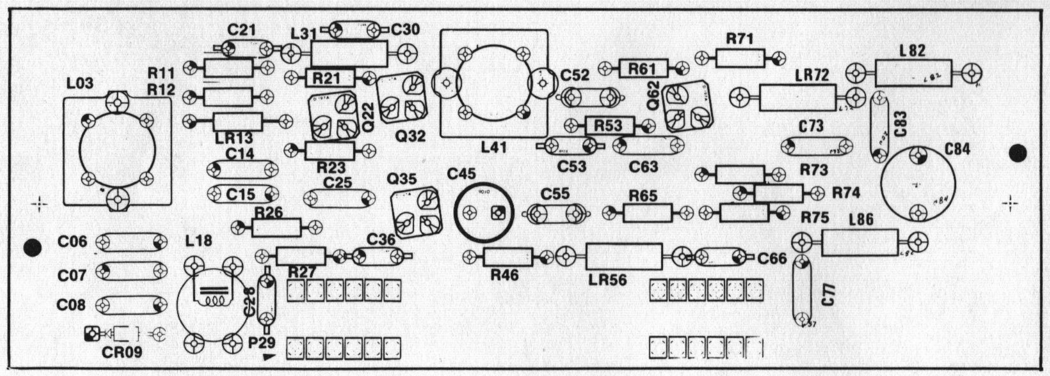
A55 LIMITER BOARD



A57 CONVERTER OSCILLATOR BOARD
(SN B000100—B000119)



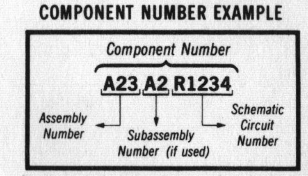
A56 CONVERTER CONTROL BOARD



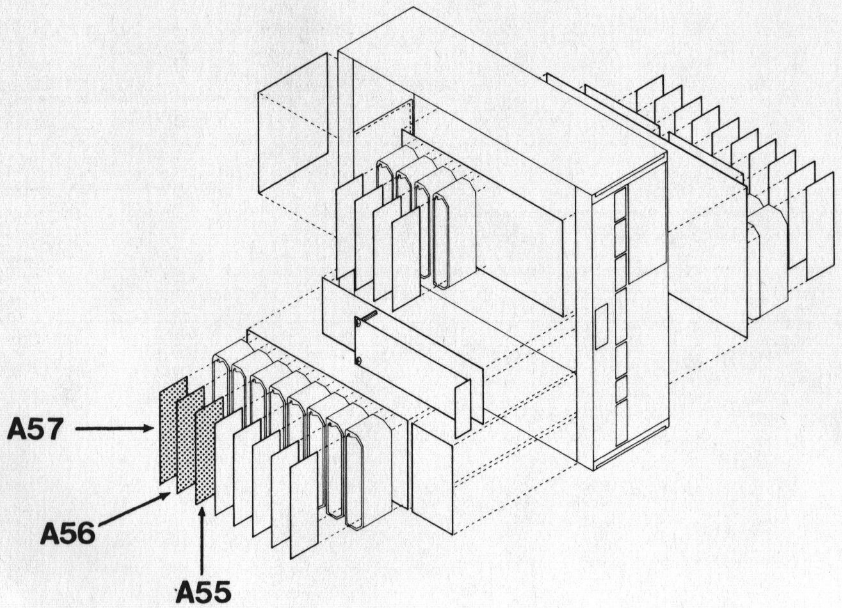
A57 CONVERTER OSCILLATOR BOARD
(SN B010120—UP)

Static Sensitive Devices
See Maintenance Section

COMPONENT NUMBER EXAMPLE

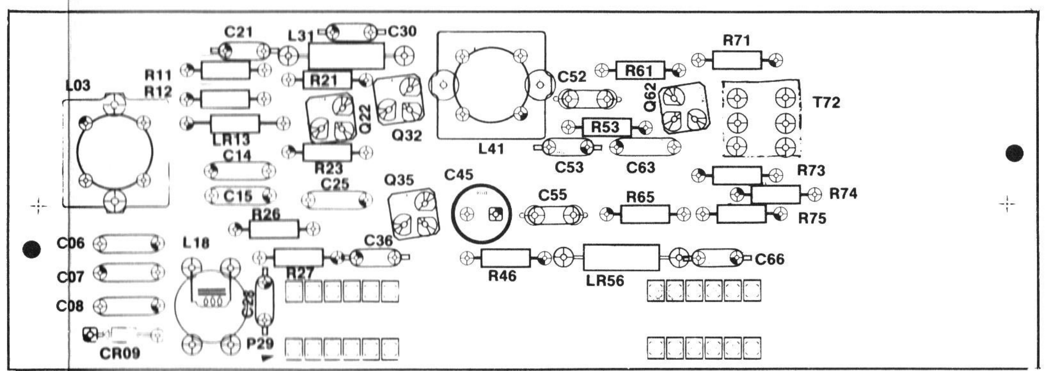


Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.



Circuit Number	Schematic Location
ASSY A55	
C05	C1
C09	C1
C14	C2
C18	D2
C24	C2
C34	C2
C44	C2
C54	C3
C64	C3
C69	C4
C74	C3
C84	C3
C87	C3
C89	D3
C94	C4
C98	D4
CR11	D1
CR31	D2
CR61	D3
CR81	D3
L05	C1
L15	C2
L17	C1
L35	C2
L37	C2
L45	C2
L54	C2
L57	C2
L58	C4
L64	C3
L75	C3
L76	C3
L84	C3
Q02	D2
Q09	C1
Q15	C1
Q21	D2
Q22	C2
Q32	D2
Q35	C2
Q41	D2
Q43	C2
Q52	D3
Q55	C3
Q60	D3
Q62	C3
Q75	C3
Q81	D3
Q90	D4
Q92	C4
R00	D1
R01	D1
R02	D2
R04	C1
R05	C1
R08	C1
R11	D2
R12	C2
R15	C2
R18	D1
R19	C1
R21	D2
R22	D2
R24	C2
R25	C2
R26	C2
R30	D2
R31	C2
R34	C2
R35	C2
R41	D2
R45	C2
R46	C2
R47	C2
R50	D3
R51	D3
R52	D3

G	H	I	J	K	L	M



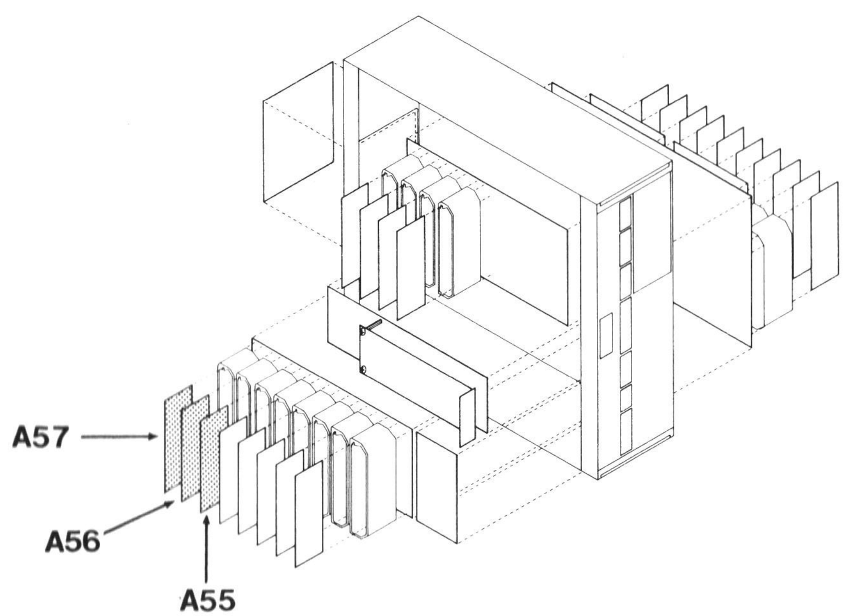
A57 CONVERTER OSCILLATOR BOARD
(SN B000100—B000119)

Static Sensitive Devices
See Maintenance Section

COMPONENT NUMBER EXAMPLE

Component Number
A23 A2 R1234
Assembly Number — *Subassembly Number (if used)* — *Schematic Circuit Number*

Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.



Converter LO & Limiter ⟨10⟩

Circuit Number	Schematic Location	Board Location
ASSY A55		
C05	C1	A2
C09	C1	A2
C14	C2	B2
C18	D2	B2
C24	C2	B2
C34	C2	C2
C44	C2	C2
C54	C3	D2
C64	C3	D2
C69	C4	D2
C74	C3	E1
C84	C3	E2
C87	C3	E2
C89	D3	E2
C94	C4	F1
C98	D4	F2
CR11	D1	B1
CR31	D2	C1
CR61	D3	D1
CR81	D3	E1
L05	C1	A2
L15	C2	B2
L17	C1	B2
L35	C2	B2
L37	C2	C2
L45	C2	C2
L54	C2	D2
L57	C2	D2
L58	C4	D2
L64	C3	D2
L75	C3	E2
L76	C3	E2
L84	C3	E2
Q02	D2	A1
Q09	C1	A2
Q15	C1	B2
Q21	D2	B1
Q22	C2	B1
Q32	D2	C1
Q35	C2	C2
Q41	D2	C1
Q43	C2	C1
Q52	D3	D1
Q55	C3	D2
Q60	D3	D1
Q62	C3	D1
Q75	C3	E2
Q81	D3	E1
Q90	D4	F1
Q92	C4	F1
R00	D1	A1
R01	D1	A1
R02	D2	A1
R04	C1	A2
R05	C1	A2
R08	C1	A2
R11	D2	B1
R12	C2	B1
R15	C2	B2
R18	D1	B2
R19	C1	B2
R21	D2	B1
R22	D2	B1
R24	C2	B2
R25	C2	B2
R26	C2	B2
R30	D2	B1
R31	C2	C1
R34	C2	C2
R35	C2	B2
R41	D2	C1
R45	C2	C2
R46	C2	C2
R47	C2	C2
R50	D3	D1
R51	D3	C1
R52	D3	D1
R57	C3	C2
R61	C3	D1
R62	D3	D1
R64	C3	D2
R65	C3	D2
R70	D3	E1
R71	D3	E1
R73	C3	D2
R74	C3	D2
R75	C3	E2
R80	D3	E1
R81	C3	E1
R82	D4	E1
R84	C3	E2
R94	C4	F2
R95	C4	E2
ASSY A56		
C03	A2	A4
C05	B1	A5
C13	B1	B4
C15	A1	B5
C30	B2	C4
C31	A2	C4
C35	B2	B5
C37	B2	B5
C46	A2	D5
C51	B2	D4
C61	B3	D4
C70	B3	E4
C73	A3	E4
C76	A3	E5
C78	A1	E5
C84	A3	E5
C85	A3	E5
C88	A1	E6
CR62	A3	D4
CR94	A3	F5
L13	B1	B4
L14	B1	B5
L50	B2	D4
L60	B2	D4
L76	A1	D5
L78*	A1	D5
LR03	A1	A5
LR12	A2	A4
Q02	A2	A4
Q35	B2	C5
Q55A	A2	D5
Q55B	A2	D5
Q64	A3	D5
Q74	A3	E5
Q91	B3	F4
Q92	B3	F4
Q95	A3	F5
R03*	A1	A5
R04	B2	A5
R06	A1	A5
R10	A2	B4
R11	A2	B4
R16	A1	B5
R21	A2	B4
R25	A2	B5
R31	A2	C4
R32	B2	C4
R34	B2	C5
R35	B2	C5
R36	B2	B5
R43	B2	C4
R45	B2	C5
R52	A2	D4
R53	A2	D5
R63	A3	D5
R71	B3	E4
R72	B3	E4
R73	A3	E4
R76	A3	D5
R80	B3	E4
R81	B3	E4
R82	A3	E4
R83	A3	E4
R84	A3	E5
R85	A3	E5
R87	A3	E5
R88	A3	E5
TP70	B3	E4
U22	A2	B4
Y18	A1	A5
ASSY A57		
C06	A4	H2,A8
C07	A4	H2,A8
C08	A4	H2,A9
C14	A4	H2,B8
C15	A4	H2,B8
C21	A4	H1,B7
C25	B5	I2,B8
C28	A4	H2,B8
C30	A5	I1,C7
C36	A4	I2,C8
C45	B5	I2,C8
C52	A5	J1,D7
C53	B5	J1,D8
C55	A5	J2,C8
C63	A5	J1,D8
C66	A5	K2,D8
C73	B5	E8
C77	B5	E8
C83	B5	E8
C84	B5	E8
CR09	A4	H2,A9
L03	A4	G1,A8
L18	A4	H2,B8
L31	A5	I1,B7
L41	A5	I1,C7
L82	B5	E7
L86	B5	E8
LR13	A4	H1,B8
LR56	B5	J2,D8
LR72	A5	E7
Q22	A5	I1,B8
Q32	A5	I1,C8
Q35	B5	I2,C8
Q62	A5	J1,D7
R11	A4	H1,B7
R12	A4	H1,B7
R21	A4	I1,B7
R23	A5	I1,B8
R26	A4	H2,B8
R27	A4	H2,B8
R46	B5	J2,C8
R53	A5	J1,D8
R61	A5	J1,D7
R65	A5	J2,D8
R71	A5	K1,D7
R73	A5	K2,E8
R74	A5	K2,E8
R75	A5	K2,E8
T72*	A5	K1
P/O ASSY A59		
C55	C4	K5
C56	D4	K5
C57	B5	K5
P91	C1	N2
P97	A5	N4

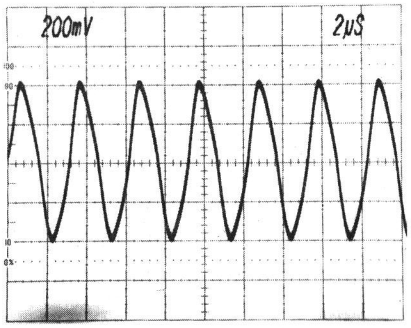
Component locations for A59 are shown on the reverse side of Audio Output B000100—B010187.

* Note applicable serial number ranges for earlier board versions.

2200-140

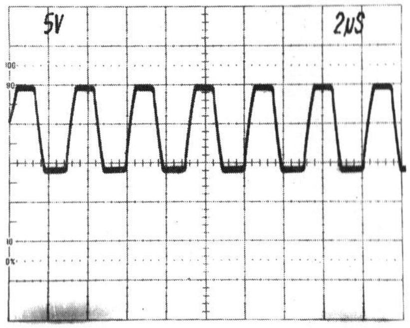
10

1



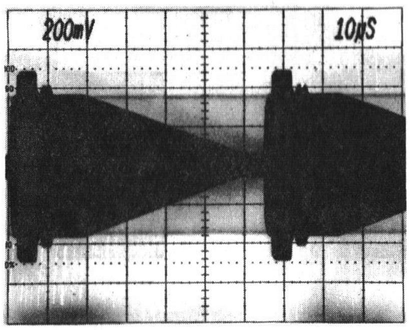
AC COUPLED

2



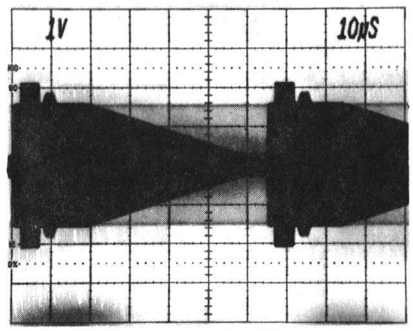
0 V

3



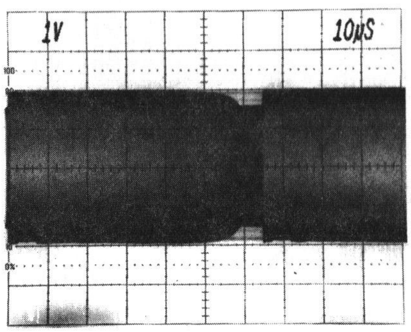
0 V

4



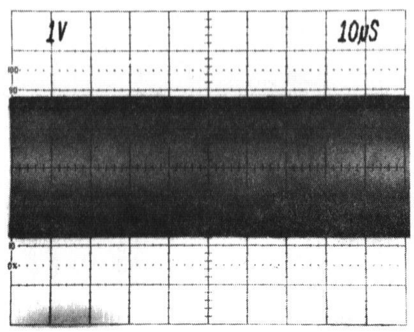
AC COUPLED

5



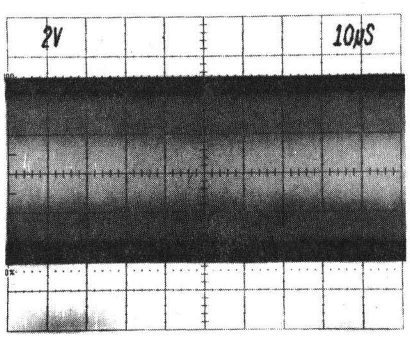
AC COUPLED

6



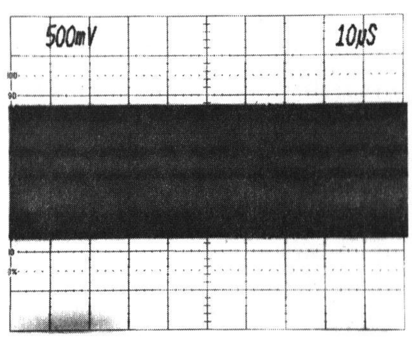
AC COUPLED

7

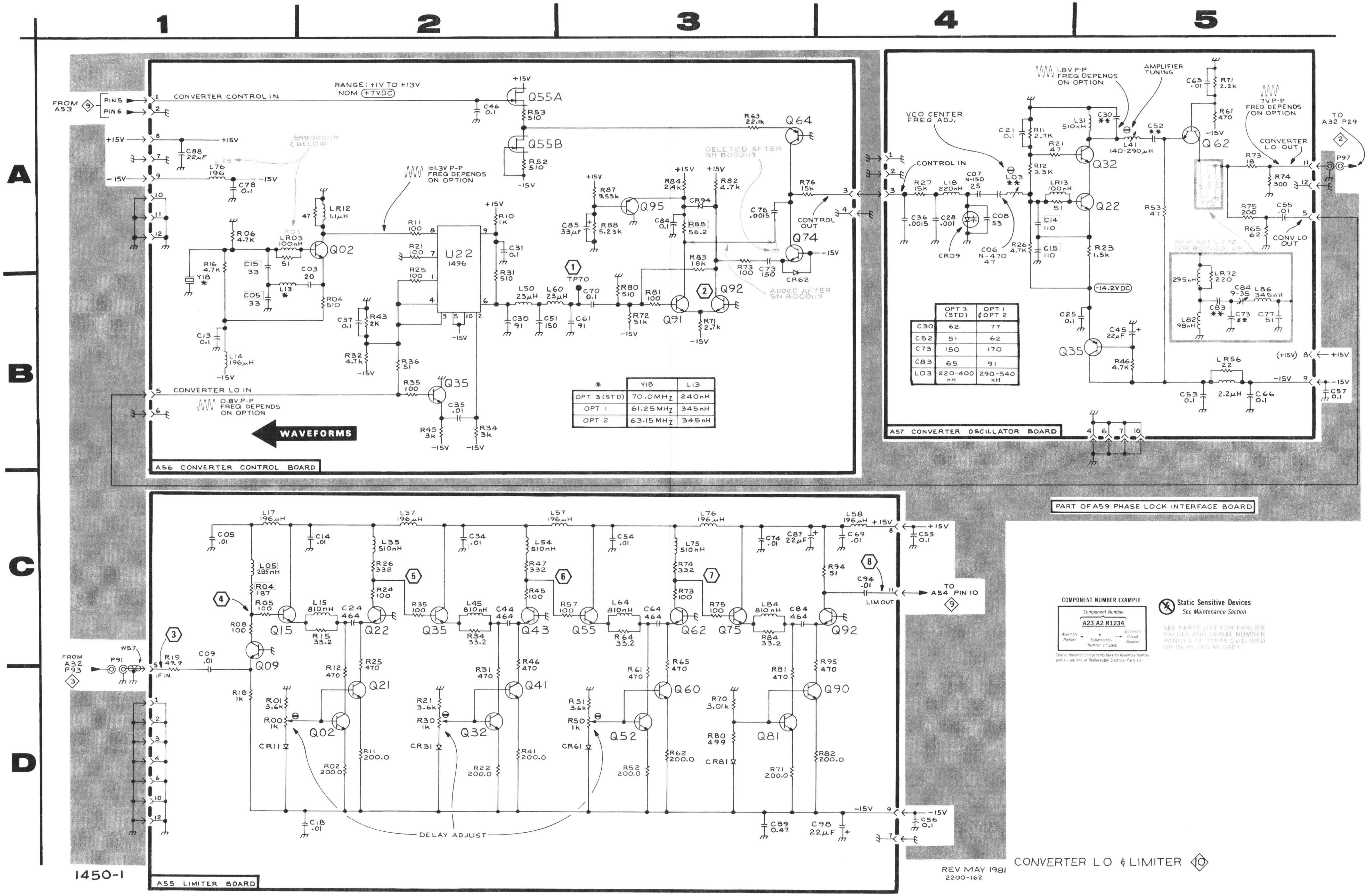


AC COUPLED

8



0 V



*	Y18	L13
OPT 3 (STD)	70.0MHz	240nH
OPT 1	61.25MHz	345nH
OPT 2	63.15MHz	345nH

	OPT 3 (STD)	OPT 1 & OPT 2
C30	62	77
C52	51	62
C73	150	170
C83	65	91
LO3	220-400 nH	290-540 nH

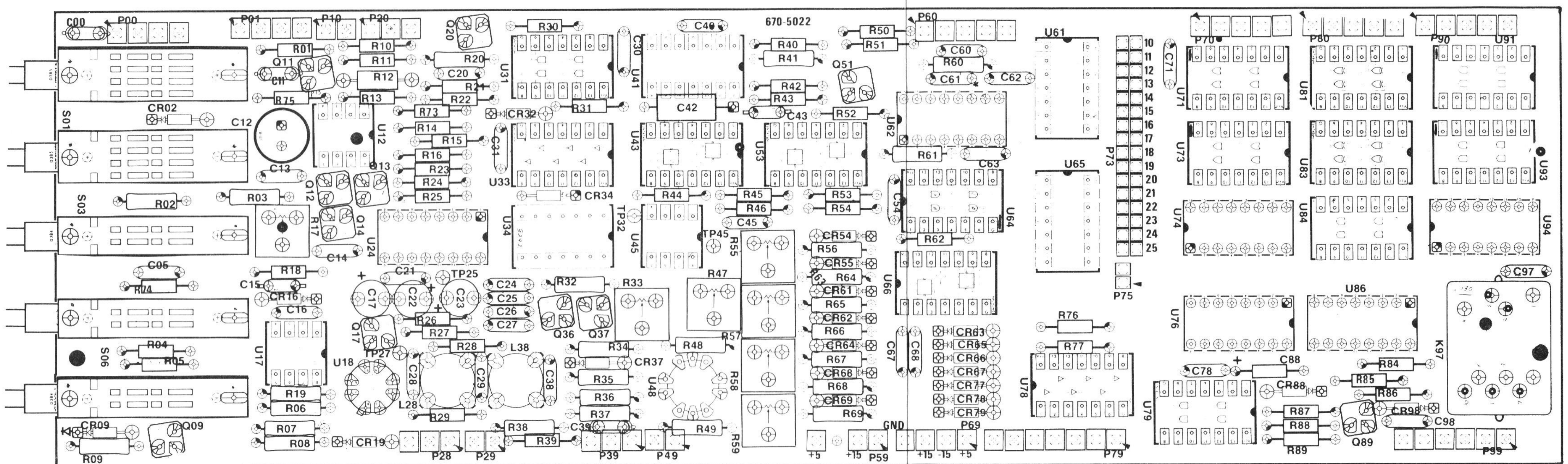
REV MAY 1981
2200-162

CONVERTER LO & LIMITER (10)

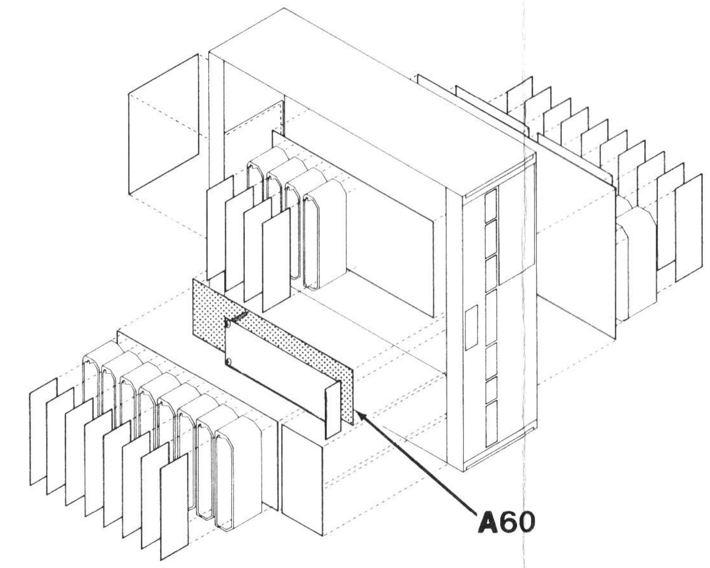
CONV. LO & LIMITER
A55, A56, A57

A B C D E F G H I J K L

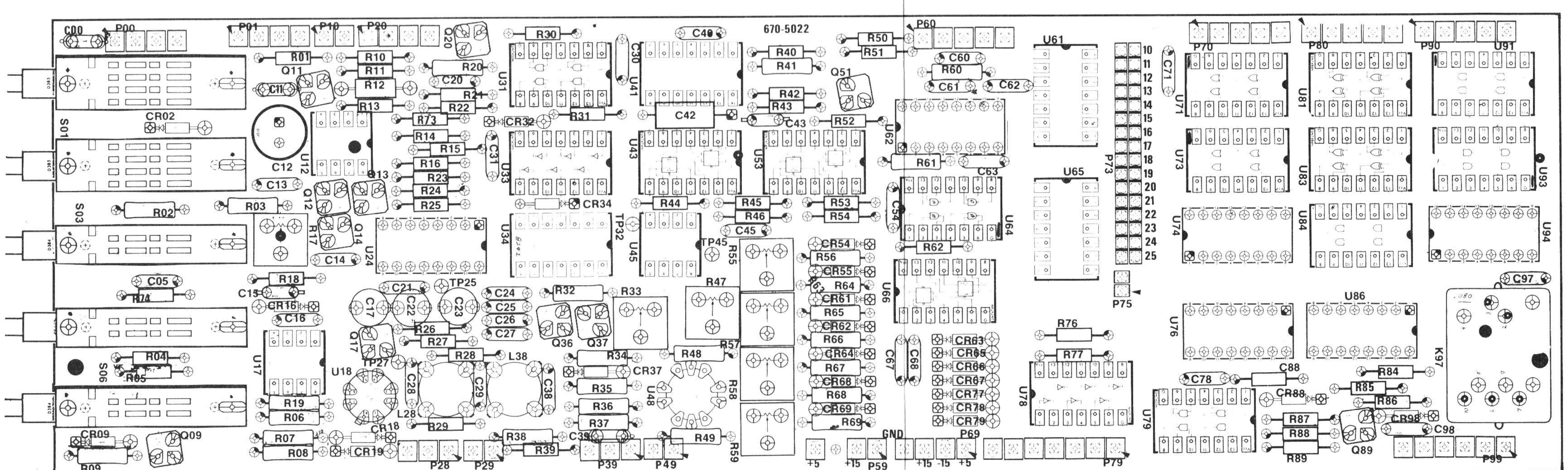
1 2 3 4



A60 AGC CONTROL BOARD
(SN B010214—UP)



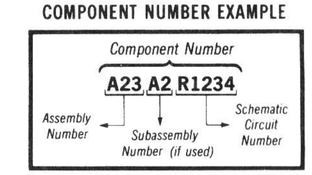
5 6 7 8 9



A60 AGC CONTROL BOARD
(SN B010120—B010213)

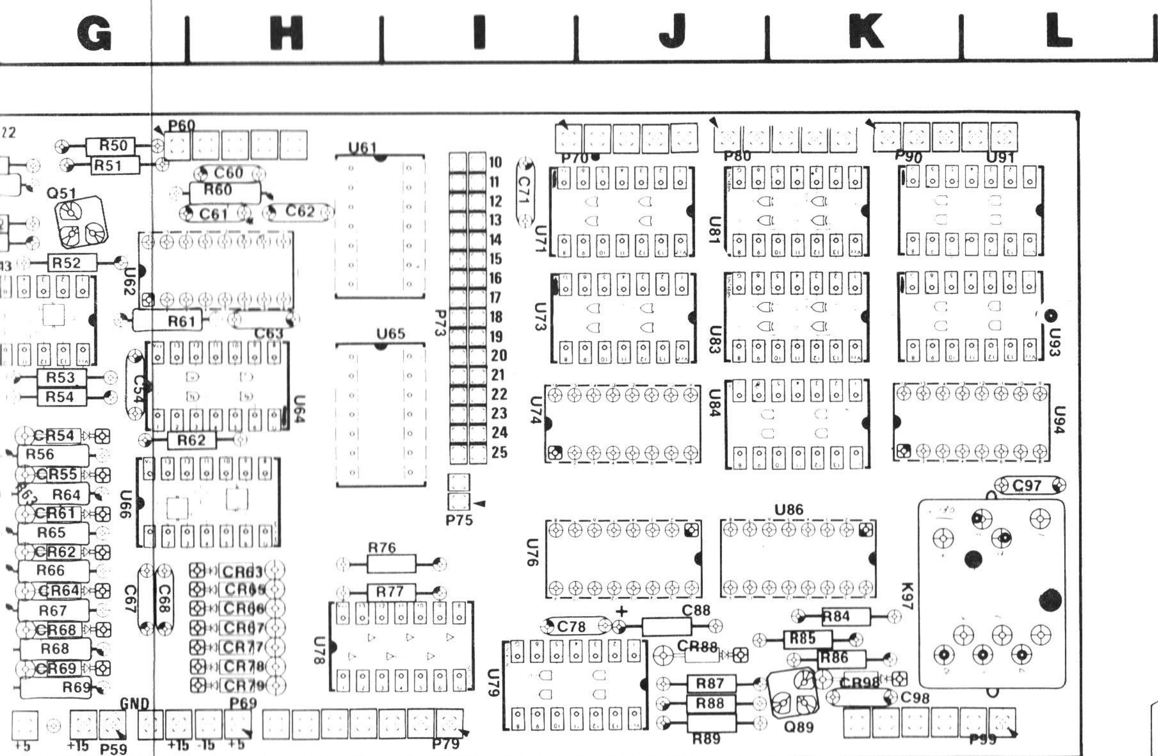
Static Sensitive Devices
See Maintenance Section

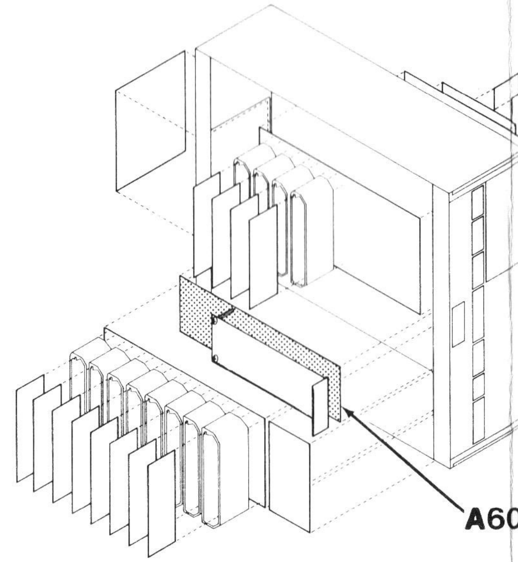
COMPONENT NUMBER EXAMPLE

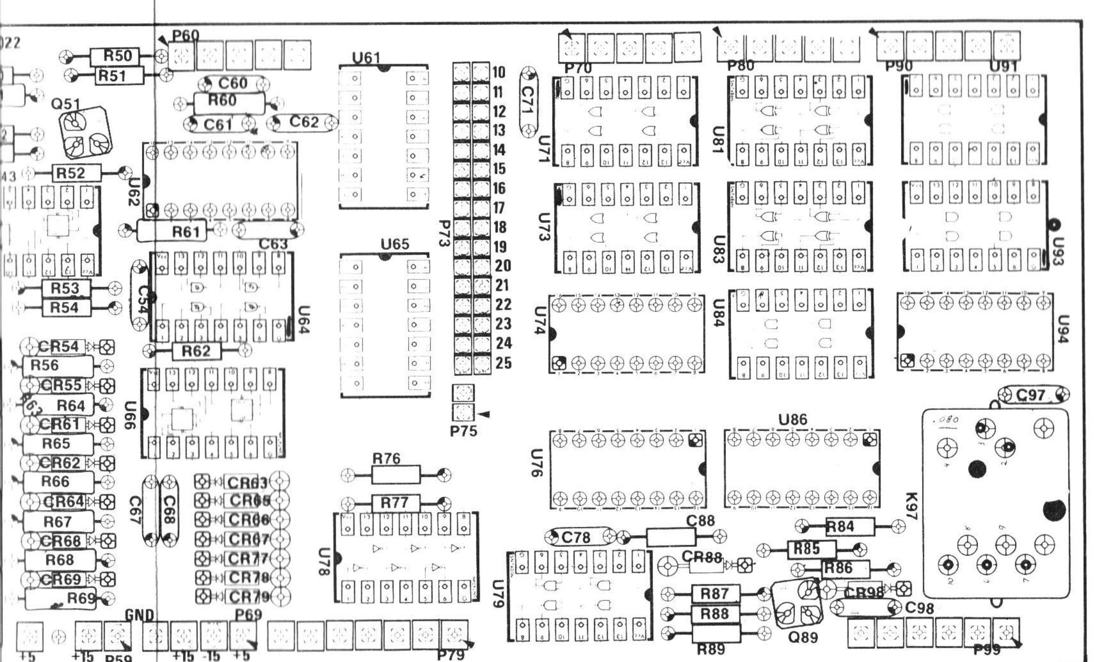


Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

@

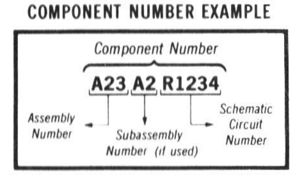






Static Sensitive Devices
See Maintenance Section

COMPONENT NUMBER EXAMPLE



Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

AGC Sample & Hold and Zero Carrier Timing ⟨11⟩

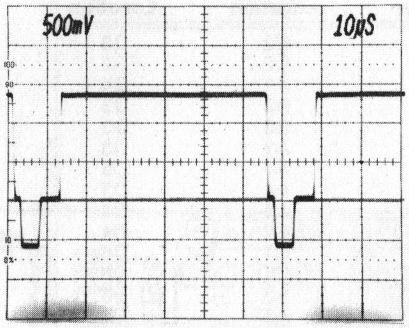
Circuit Number	Schematic Location	Board Location
P/O ASSY A60		
C00	C5	A1,A5
C05	B2	B3,B7
C11	B5	C1,C6
C12	B4	C2,C6
C13	B2	C2,C6
C14	A4	C3,C7
C17	C2	C3,C7
C20	B3	D1,D6
C21	B2	D3,D7
C22	C2	D3,D7
C23	C2	D3,D7
C24	C2	D3,D7
C25	C2	D3,D7
C26	C2	D3,D7
C27	C2	D3,D7
C28	C1	D3,D8
C29	C1	D3,D8
C30	A3	E1,E5
C31	B2	D2,D6
C38	C1	E3,E8
C40	B2	F1,F5
C42	C3	F1,F6
C43	C3	F2,F6
C45	A5	F2,F7
C54	B3	C5,G7
C60	D1	H1,H5
C61	C4	H1,H6
C62	B2	H1,H6
C63	C4	H2,H6
C67	B1	G3,G8
C68	B1	G3,G8
C71	B2	I1,I6
C78	B2	I3,I8
C97	B2	L3,L7
C98	B2	K4,K8
CR02	C4	B2,B6
CR09	A1	A4,A8
CR18*	A2	C8
CR19	A2	C4,C8
CR32	A3	D2,E6
L28	C1	D4,D8
L38	C1	D3,D8
P73	B4	I2,I6
Q09	A1	B4,B8
Q11	B4	C1,C6
Q12	A4	C2,C6
Q13	A5	C2
Q13*	A3	C6
Q14	A4	C2,C7
Q17	C1	C3,C8
Q20	B3	D1,D5
Q51	D2	G1,G6
R01	B5	C1,C5
R02	D2	B2,B7
R03	C2	C2,C7
R04	A1	B3,B8
R07	A1	C4,C8
R08	A1	C4,C8
R09	A1	A4,A8
R10	B5	C1,C5
R11	B4	C1,C6
R12	B4	C1,C6
R13	A4	C1,C6
R14	C2	D2,D6
R15	C2	D2,D6
R16	D2	D2,D6
R17	A1	C2,C7
R20	B3	D1,D6
R21	B3	D1,D6
R22	A3	D1,D6
R23	A4	D2,D6
R24	A4	D2,D6
R25	A4	D2,D7
R26	C2	D3,D7
R27	C1	D3,D8
R28	C1	D3,D8
R29	A2	D4,D8
R30	A3	E1,E5
R31	A3	E1,E6
R38	C1	D4,D8
R39	A3	E4,E8
R40	A5	F1,F5
R41	C3	F1,F6
R42	C3	F1,F6
R43	C3	F1,F6
R44	A4	F2,F7
R45	A5	F2,F7
R46	A5	F2,F7
R50	D4	G1,G5
R51	D1	G1,G5
R52	D2	G2,G6
R60	C4	H1,H6
R61	C4	G2,G6
R62	B3	G2,G7
R73	A4	D1
R73*	A5	D6
R76	D1	I3,H7
R77	D1	I3,I8
S01	B4	A2,A6
S03	C4	A2,A7
S06	A1	A3,A8
TP27	B1	D3,D8
TP32	A4	E2,E7
U18	A4	C3,C8
U24	C2	D2,D7
U31A	A3	E1,D6
U31B	A3	E1,D6
U31C	A3	E1,D6
U31D	A3	E1,D6
U33A	A2	E2,E6
U33B	A2	E2,E6
U33C	D2	E2,E6
U33D	C2	E2,E6
U33E	C2	E2,E6
U33F	D1	E2,E6
U34	C3	E2,D7
U41	D3	F1,F6
U43A	C3	F2,E6
U45A	A5	F2,E7
U53A	B4	F2,F6
U53B	B3	F2,F6
U61	C4	H1,H6
U62A	C4	G2,G6
U62B	C4	G2,G6
U64A	B3	H2,H7
U64C	D5	H2,H7
U65	C4	H2,I6
W34	B3	E2,D7

*** Note applicable serial number ranges for earlier board versions.**

2200-141

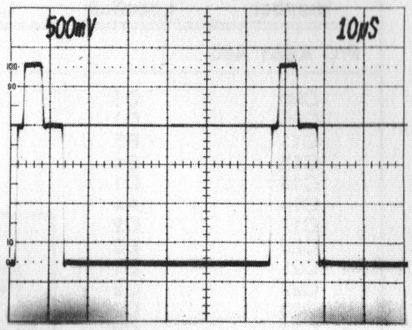
11

1



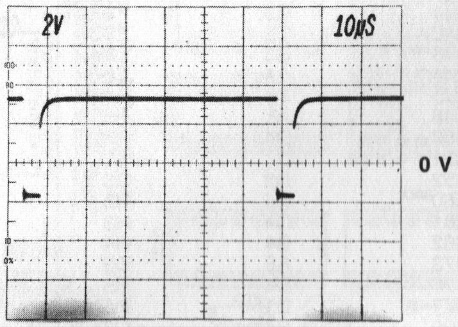
DC COUPLED

2



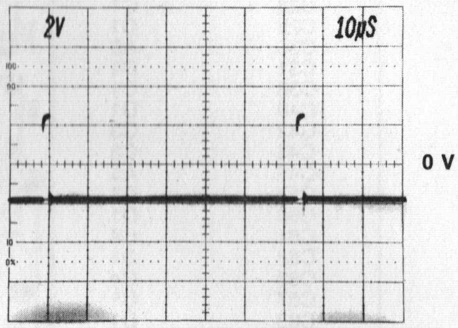
AC COUPLED

3



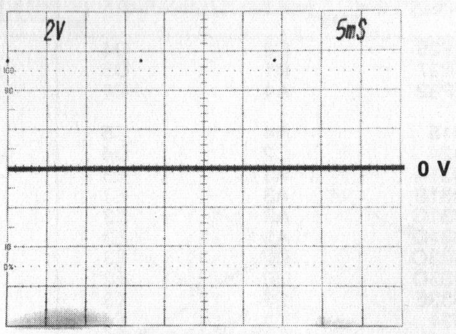
DC COUPLED

4



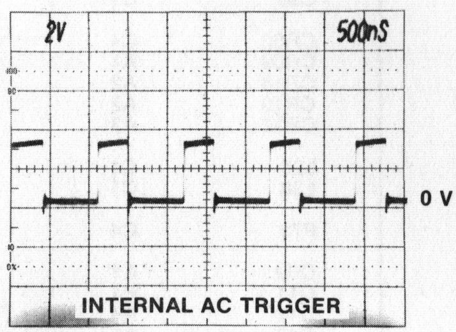
DC COUPLED

5



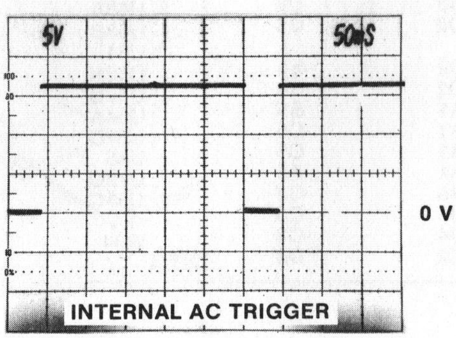
DC COUPLED

6

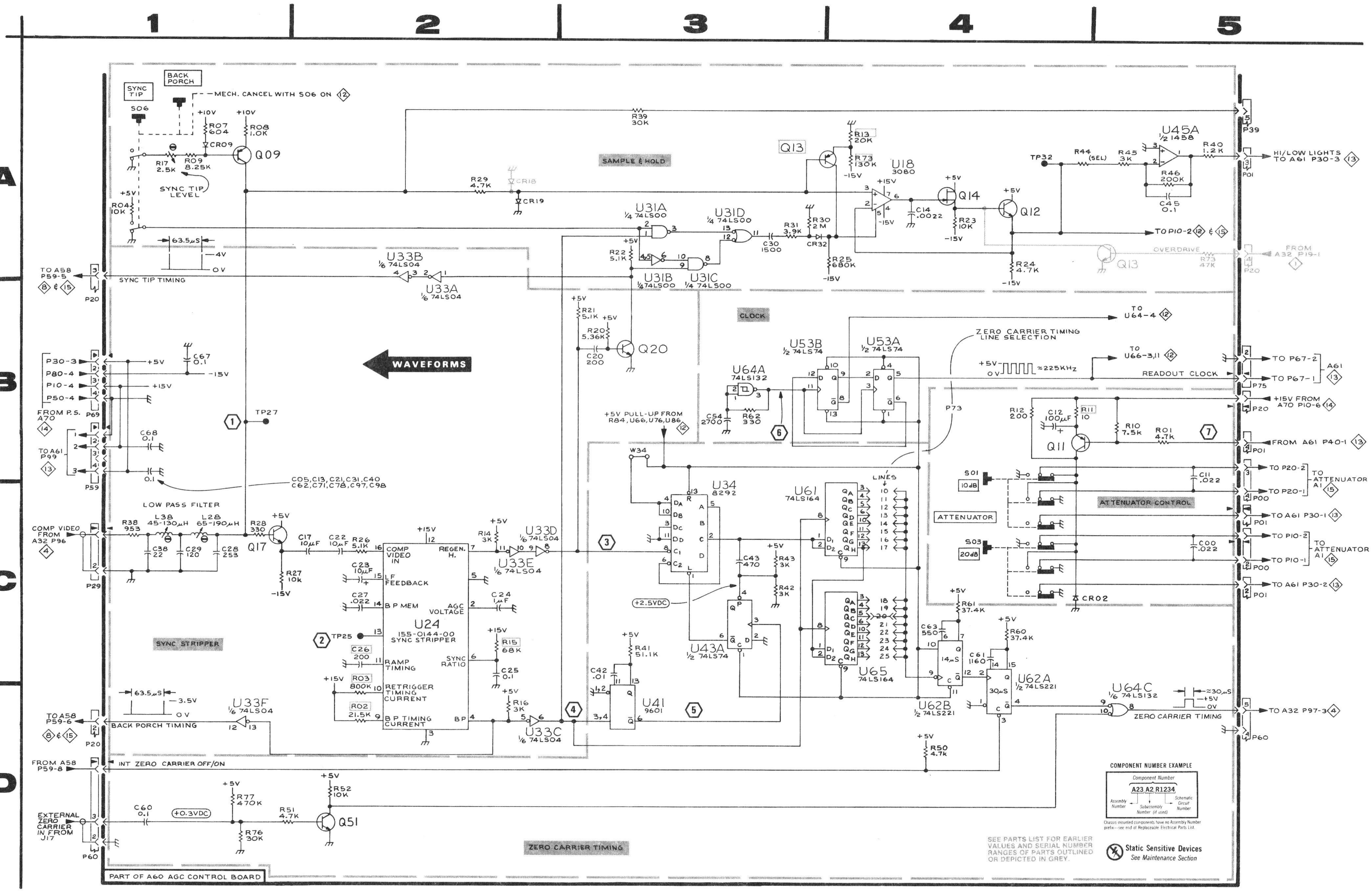


DC COUPLED

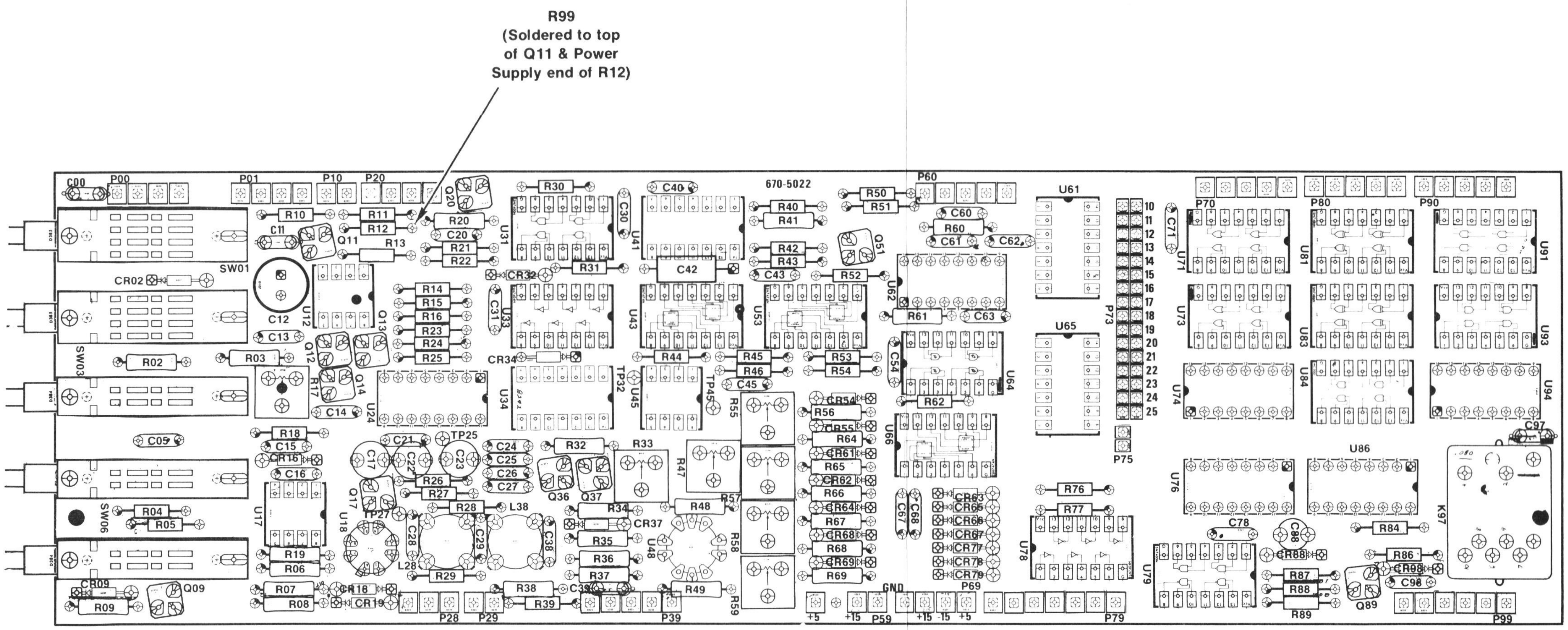
7



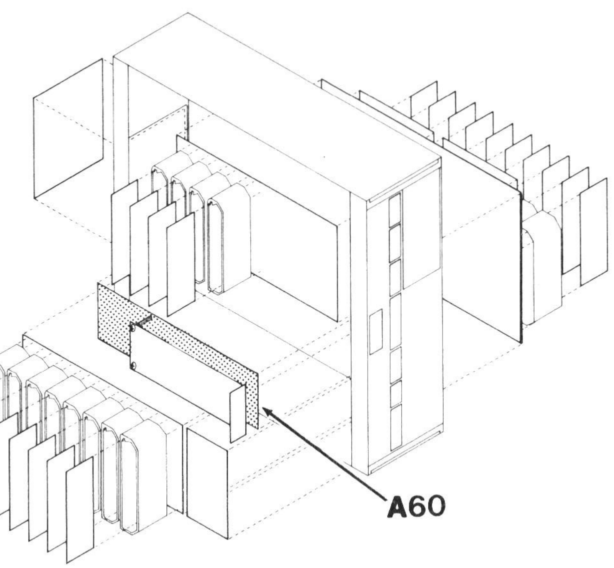
DC COUPLED



AGC SAMPLE & HOLD and ZERO CARRIER TIMING 11



A60 AGC CONTROL BOARD
(SN B000100—B000119)



Static Sensitive Devices
See Maintenance Section

COMPONENT NUMBER EXAMPLE

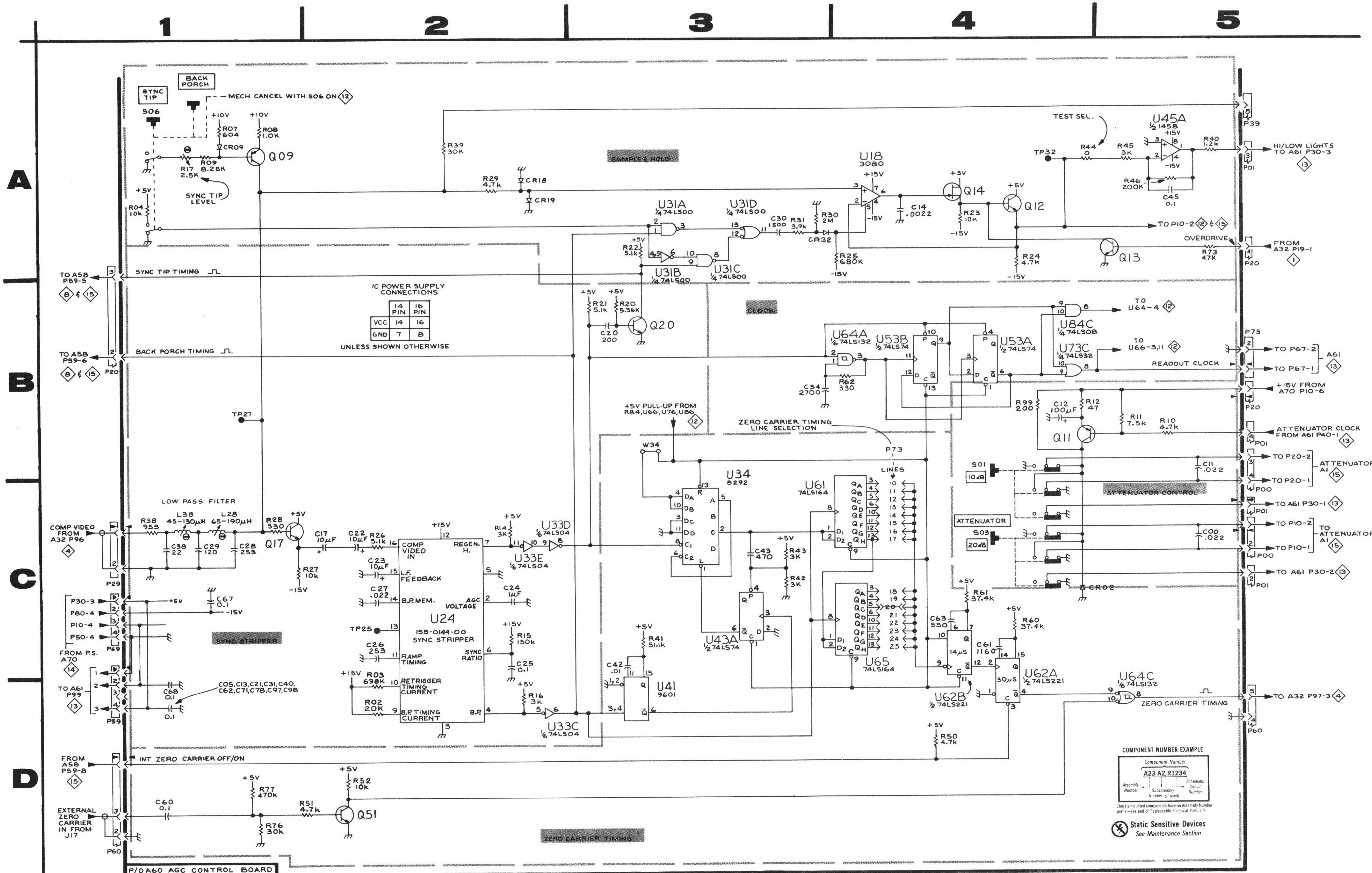
Component Number
A23 A2 R1234
Assembly Number — Subassembly Number (if used) — Schematic Circuit Number

Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

AGC Sample & Hold and Zero Carrier Timing ⟨11⟩

Circuit Number	Schematic Location	Board Location
P/O ASSY A60		
C00	C5	A2
C05	D1	B4
C11	B5	C3
C12	B4	C3
C13	D1	C3
C14	A4	C4
C17	C2	C4
C20	B3	D3
C21	D1	D4
C22	C2	D4
C23	C2	D4
C24	C2	D4
C25	C2	D4
C26	C2	D4
C27	C2	D5
C28	C1	D5
C29	C1	D5
C30	A3	E3
C31	D1	D3
C38	C1	E4
C40	D1	F2
C42	C3	F3
C43	C3	F3
C45	A5	F4
C54	B3	G4
C60	D1	H3
C61	C4	H3
C62	D1	H3
C63	C4	H3
C67	C1	G5
C68	D1	G5
C71	D1	I3
C78	D1	J5
C97	D1	L4
C98	D1	K5
CR02	C4	B3
CR09	A1	A5
CR18	A2	C5
CR19	A2	C5
CR32	A3	D3
L28	C1	D5
L38	C1	D5
P73	C4	I3
Q09	A1	B5
Q11	B4	C3
Q12	A4	C3
Q13	A5	C3
Q14	A4	C4
Q17	C1	C5
Q20	B3	D2
Q51	D2	G3
R02	D2	B4
R03	D2	B4
R04	A1	B5
R07	A1	C5
R08	A1	C5
R09	A1	A5
R10	B5	C3
R11	B5	C3
R12	B4	C3
R14	C2	D3
R15	C2	D3
R16	D2	D3
R17	A1	C4
R20	B3	D3
R21	B3	D3
R22	A3	D3
R23	A4	D3
R24	A4	D3
R25	A4	D4
R26	C2	D4
R27	C1	D5
R28	C1	D5
R29	A2	D5
R30	A3	E2
R31	A3	E3
R38	C1	D5
R39	A2	E4
R40	A5	F2
R41	C3	F3
R42	C3	F3
R43	C3	F3
R44	A4	F4
R45	A5	F4
R46	A5	F4
R50	D4	G2
R51	D1	G2
R52	D2	G3
R60	C4	H3
R61	C4	H3
R62	B4	H4
R73	A5	D3
R76	D1	H5
R77	D1	H5
R99	B4	C3
S01	B4	B3
S03	C4	A4
S06	A1	A5
TP25	C2	D4
TP27	B1	D5
TP32	A4	E4
U18	A4	C5
U24	C2	D4
U31A	A3	E3
U31B	A3	E3
U31C	A3	E3
U31D	A3	E3
U33C	D2	E3
U33D	C2	E3
U33E	C2	E3
U34	C3	E4
U41	D3	F3
U43A	C3	F3
U45A	A5	E4
U53A	B4	F3
U53B	B4	F3
U61	C4	H3
U62A	C4	G3
U62B	C4	G3
U64A	B4	H4
U64C	D5	H4
U65	C4	H3
U73C	B4	J3
U84C	B4	J4
W34	B3	E4

2200-142

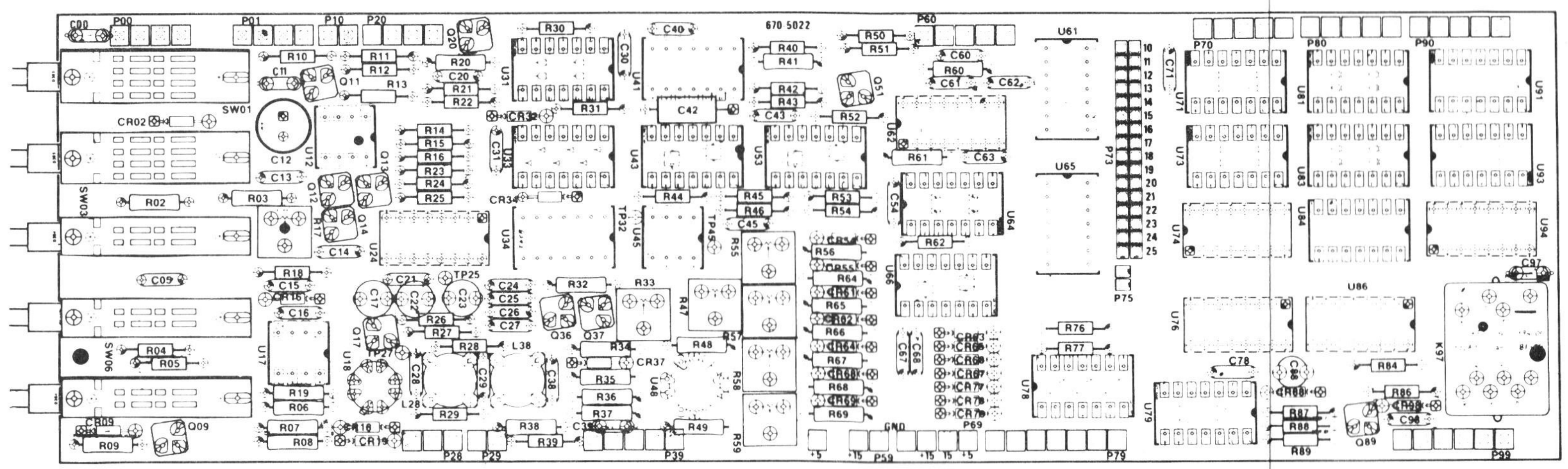


ZERO CARRIER TIMING A60 B000100-B000119

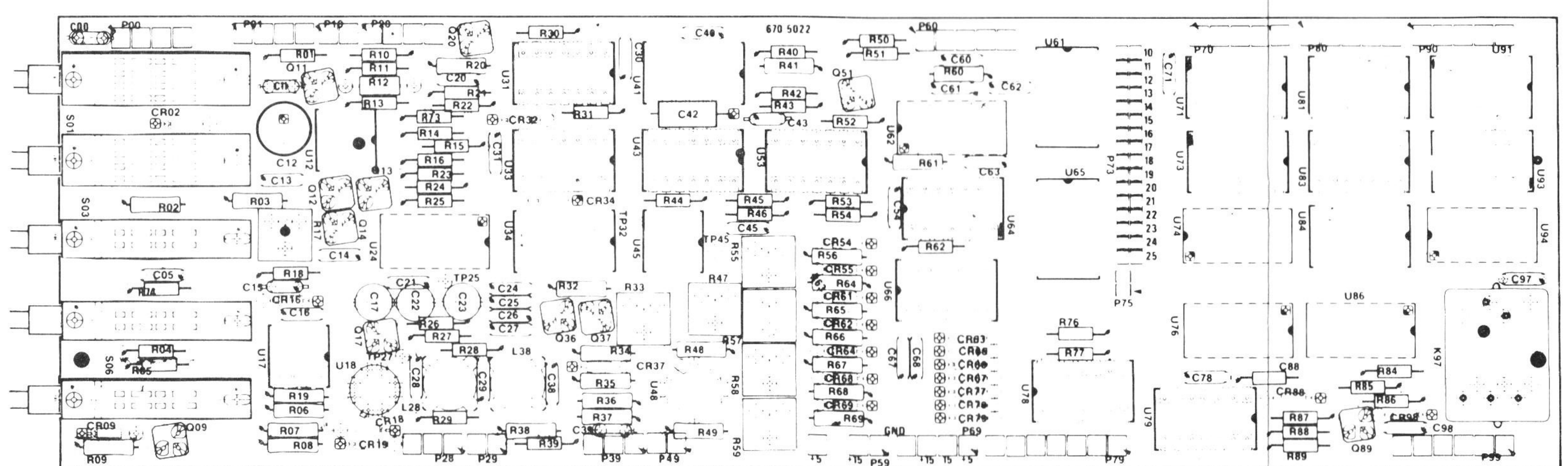
1450 B000100-B000119

2200-164

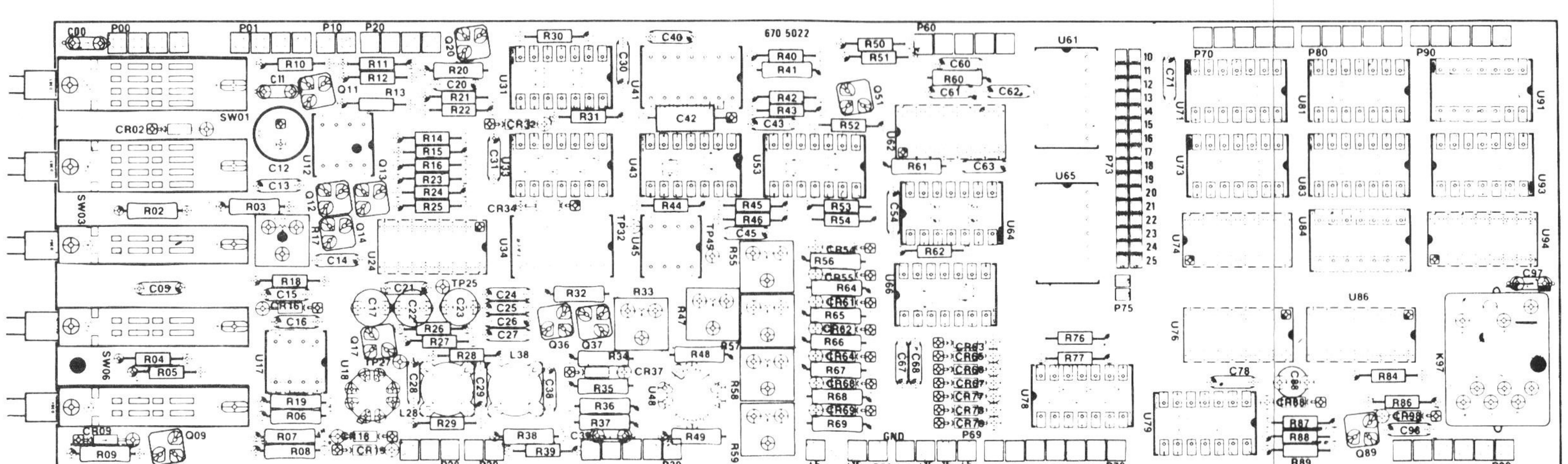
AGC SAMPLE & HOLD and ZERO CARRIER TIMING (11)



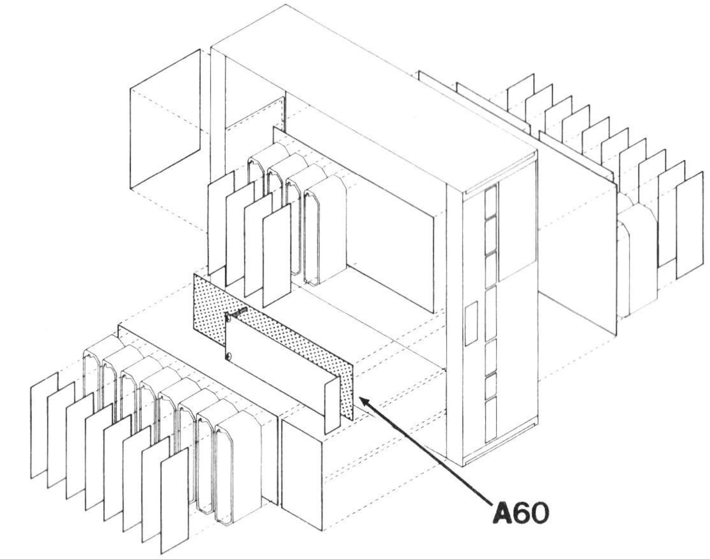
A60 AGC CONTROL BOARD
(SN B010214—UP)



A60 AGC CONTROL BOARD
(SN B010120—B010213)



A60 AGC CONTROL BOARD
(SN B000100—B000119)



Static Sensitive Devices
See Maintenance Section

COMPONENT NUMBER EXAMPLE

Component Number

A23 A2 R1234

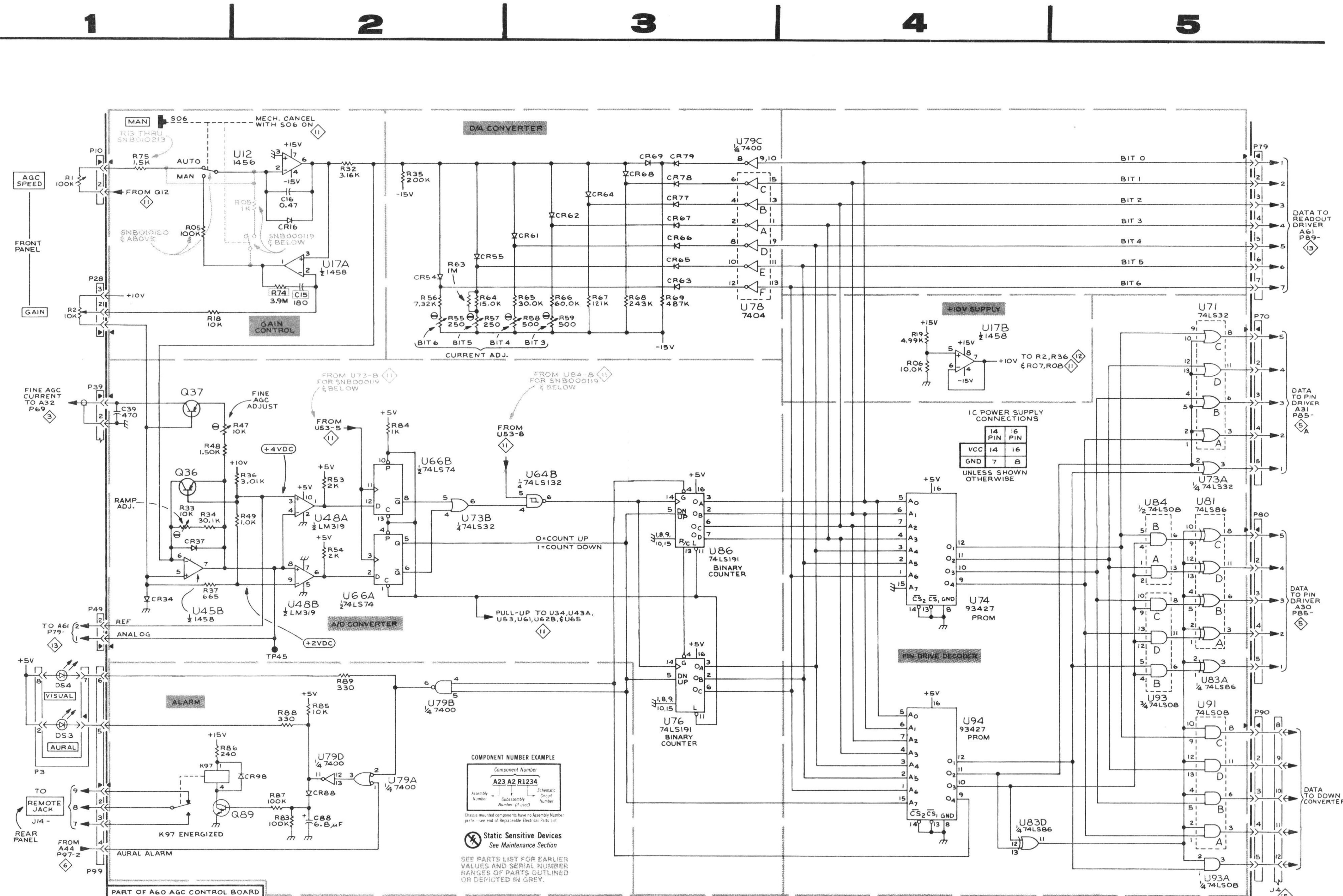
Assembly Number — *Subassembly Number (if used)* — *Schematic Circuit Number*

Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

AGC A/D Converter & Pin Drive Decoder ⟨12⟩

Circuit Number	Schematic Location	Board Location
P/O ASSY A60		
C15	B2	B2,B5,B8
C16	A2	B2,B5,B8
C39	B1	D3,D6,D9
C88	D2	G3,G6,H9
CR16	A2	B2,B5,B8
CR34	C1	D2,D5,D8
CR37	C1	D3,D6,D9
CR54	A2	E2,E5,E8
CR55	A2	E2,E5,E8
CR61	A3	E2,E5,E8
CR62	A3	E2,E5,E8
CR63	A3	F2,F5,F9
CR64	A3	E2,E5,E9
CR65	A3	F2,F5,F9
CR66	A3	F3,F6,F9
CR67	A3	F3,F6,F9
CR68	A3	E3,E6,E9
CR69	A3	E3,E6,E9
CR77	A3	F3,F6,F9
CR78	A3	F3,F6,F9
CR79	A3	F3,F6,F9
CR88	D2	H3,G6,H9
CR98	D2	H3,H6,H9
K97	D1	I1,I5,H9
Q36	B1	D2,D5,D8
Q37	B1	D2,D5,D8
Q89	D1	H3,H6,H9
R05	A1	B3
R05*	A2	B6,B9
R06	B4	B3
R13*	A1	B6,B9
R18	B1	B2,B5,B8
R19	B4	B3,B6,B9
R32	A2	D2,D5,D8
R33	C1	D2,D5,D8
R34	C1	D2,D6,D9
R35	A2	D3,D6,D9
R36	B2	D3,D6,D9
R37	C1	D3,D6,D9
R47	B1	D2,D5,D8
R48	B1	D2,D5,D9
R49	C2	D3,D6,D9
R53	B2	E2,E5,E8
R54	C2	E2,E5,E8
R55	B2	E2,E5,E8
R56	B2	E2,E5,E8
R57	B2	E2,E5,E8
R58	B3	E3,E6,E9
R59	B3	E3,E6,E9
R63	A2	E2,E5,E8
R64	B2	E2,E5,E8
R65	B3	E2,E5,E8
R66	B3	E2,E5,E8
R67	B3	E3,E6,E9
R68	B3	E3,E6,E9
R69	B3	E3,E6,E9
R74	B2	B2,B5
R75	A1	C1
R83	D2	G3,G6,G9
R84	B2	H3,H6,H9
R85	D2	H3,H6,H9
R86	D1	H3,H6,H9
R87	D2	H3,H6,H9
R88	D2	H3,H6,H9
R89	C2	H3,H6,H9
S06	A1	A3,A6,A9
TP45	C2	D2,C5,D8
U12	A2	C1,B4,B7
U17A	A2	B2,B5,B9
U17B	B4	B2,B5,B9
U45B	C1	D2,D5,D8
U48A	C2	D3,D6,D9
U48B	C2	D3,D6,D9
U64B	C3	F2,F5,F8
U66A	C2	E2,E5,E8
U66B	B2	E2,E5,E8
U71	B5	G1,G4,G7
U73A	B5	G1,G4,G8
U73B	C2	G1,G4,G8
U74	C4	G2,G5,G8
U76	C3	G2,G5,G8
U78	A3	F3,F6,F9
U79A	D2	G3,G6,G9
U79B	C2	G3,G6,G9
U79C	A3	G3,G6,G9
U79D	D2	G3,G6,G9
U81	C5	H1,H4,H7
U83A	C5	H1,H4,H8
U83D	D4	H1,H4,H8
U84A	C5	H2,H5,H8
U84B	C5	H2,H5,H8
U86	C3	H2,H5,H8
U91	D5	I1,I4,I7
U93A	D5	I1,I5,I8
U93B	C5	I1,I5,I8
U93C	C5	I1,I5,I8
U93D	C5	I1,I5,I8
U94	D4	I1,I5,I8
CHASSIS		
DS3	D1	
DS4	C1	
R1	A1	
R2	B1	

* Note applicable serial number ranges for earlier board versions.

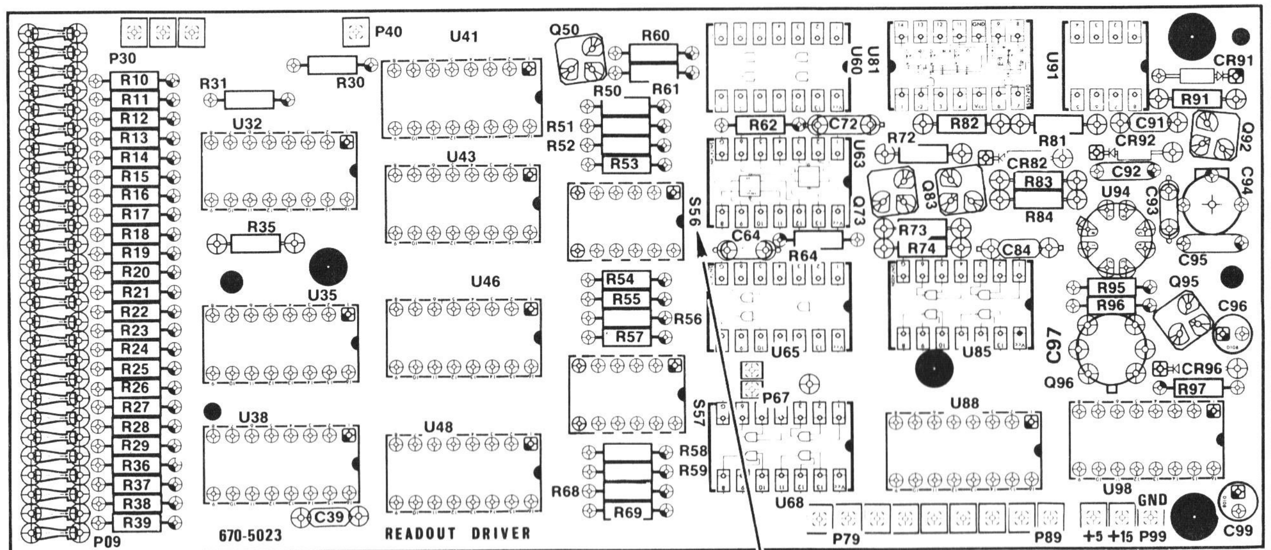


@2200-165

AGC A/D CONVERTER AND PIN DRIVE DECODER (12)

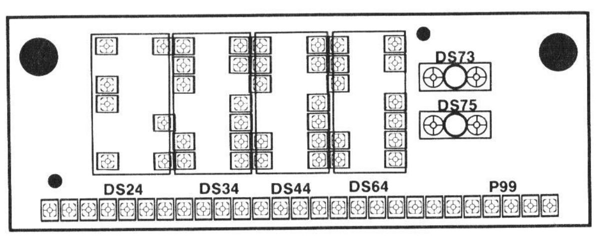
(12)

A	B	C	D	E	F	G

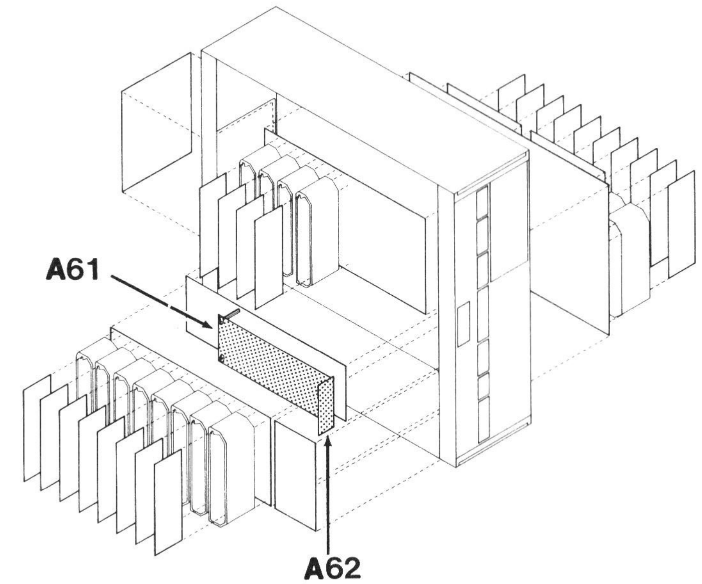


Earlier versions may have been labeled SW59

A61 READOUT DRIVER BOARD



A62 READOUT BOARD



Static Sensitive Devices
See Maintenance Section

COMPONENT NUMBER EXAMPLE

Component Number
A23 A2 R1234
Assembly Number — *Subassembly Number (if used)* — *Schematic Circuit Number*

Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

REV JUL 1983

@

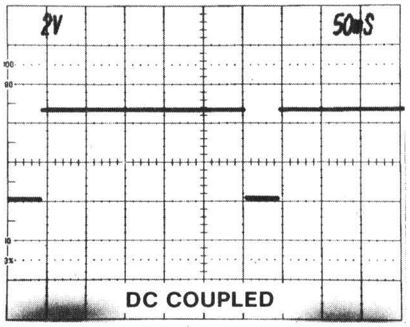
Read Out Driver (13)

Circuit Number	Schematic Location	Board Location
ASSY A61		
C39	C1	B3
C64	B4	E2
C72	B2	E1
C84	C1	F2
C91	B1	G1
C92	A3	G2
C93	A2	G2
C94	A2	G2
C95	A3	G2
C96	C1	G2
C97*	B2	F3
C99	C1	G3
CR82	A2	F2
CR91	B1	G1
CR92	A2	G1
CR96	A2	G3
Q50	A4	D1
Q73	A2	E2
Q83	A2	F2
Q92	A2	G1
Q95	A2	G2
Q96A	A2	F3
Q96B	B2	F3
R10	B5	A1
R11	B5	A1
R12	C5	A1
R13	C5	A1
R14	C5	A1
R15	C5	A2
R16	C5	A2
R17	C5	A2
R18	B5	A2
R21	C5	A2
R22	C5	A2
R23	C5	A2
R24	C5	A3
R25	C5	A3
R26	D5	A3
R27	D5	A3
R28	D5	A3
R29	D5	A3
R30	B4	C1
R31	B4	B1
R35	B5	B2
R36	D5	A3
R37	D5	A3
R38	D5	A3
R39	D5	A3
R50	B4	D1
R51	B3	D1
R52	B3	D1
R53	B4	D2
R54	C4	D2
R55	C4	D2
R56	C4	D2
R57	C4	D2
R58	D4	D3
R59	D4	D3
R60	A4	D1
R61	A4	D1
R62	B1	E1
R64	B4	E2
R68	D4	D3
R69	D4	D3
R72	A2	E1
R73	A2	E2
R74	A2	E2
R81	B1	F1
R82	A1	F1
R83	A2	F2
R84	A3	F2
R91	B1	G1
R95	A2	F3
R96	A2	F3
R97	B2	G3
S56	C3,C4	D2
S57	C4,D4	D3
TP67	A2	E3
U32	C5	B1
U35	D5	B2
U38	D5	B3
U41	C4	C1
U43	B4	C2
U46	D4	C2
U48	D4	C3
U60A	B2	E1
U60B	C2	E1
U60C	B1	E1
U60D	B2	E1
U63A	B4	E2
U63B	B1	E2
U65A	B1	E2
U65B	B4	E2
U65C	A4	E2
U68A	A2	E3
U68B	B2	E3
U68C	B3	E3
U68D	C3	E3
U81	C2	E1
U85	B2	F2
U88	D3	F3
U91	B1	F1
U94	A3	G2
U98	C2	G3
ASSY A62		
DS24	B5	A5
DS34	B5	B5
DS44	C5	B5
DS64	D5	C5
DS73	A5	C5

*See Parts List for serial number ranges.

13

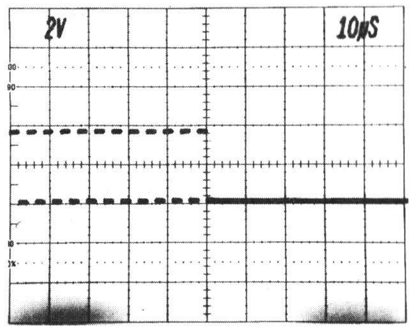
1



0 V

INTERNAL AC TRIGGER

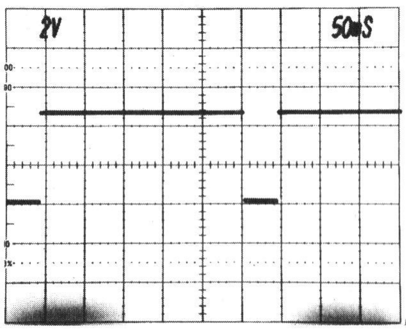
2



0 V

NUMBER OF PULSES IS A FUNCTION OF MANUAL GAIN SETTING

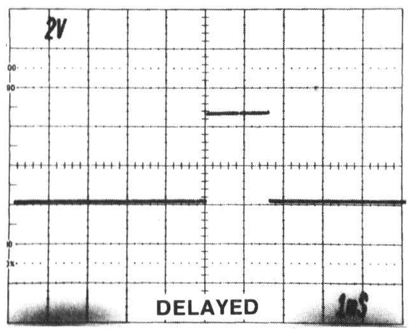
3



0 V

INTERNAL AC TRIGGER

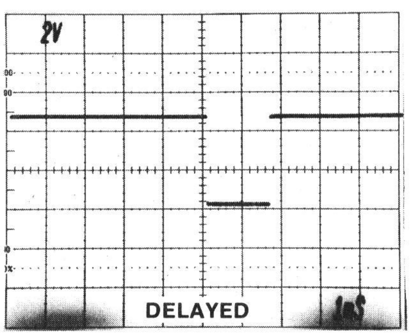
4



0 V

INTERNAL AC TRIGGER

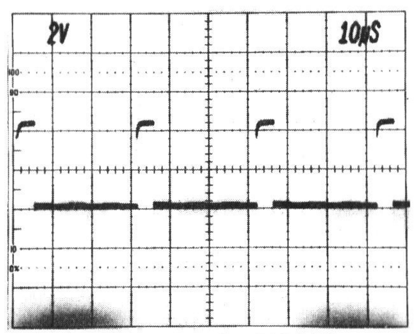
5



0 V

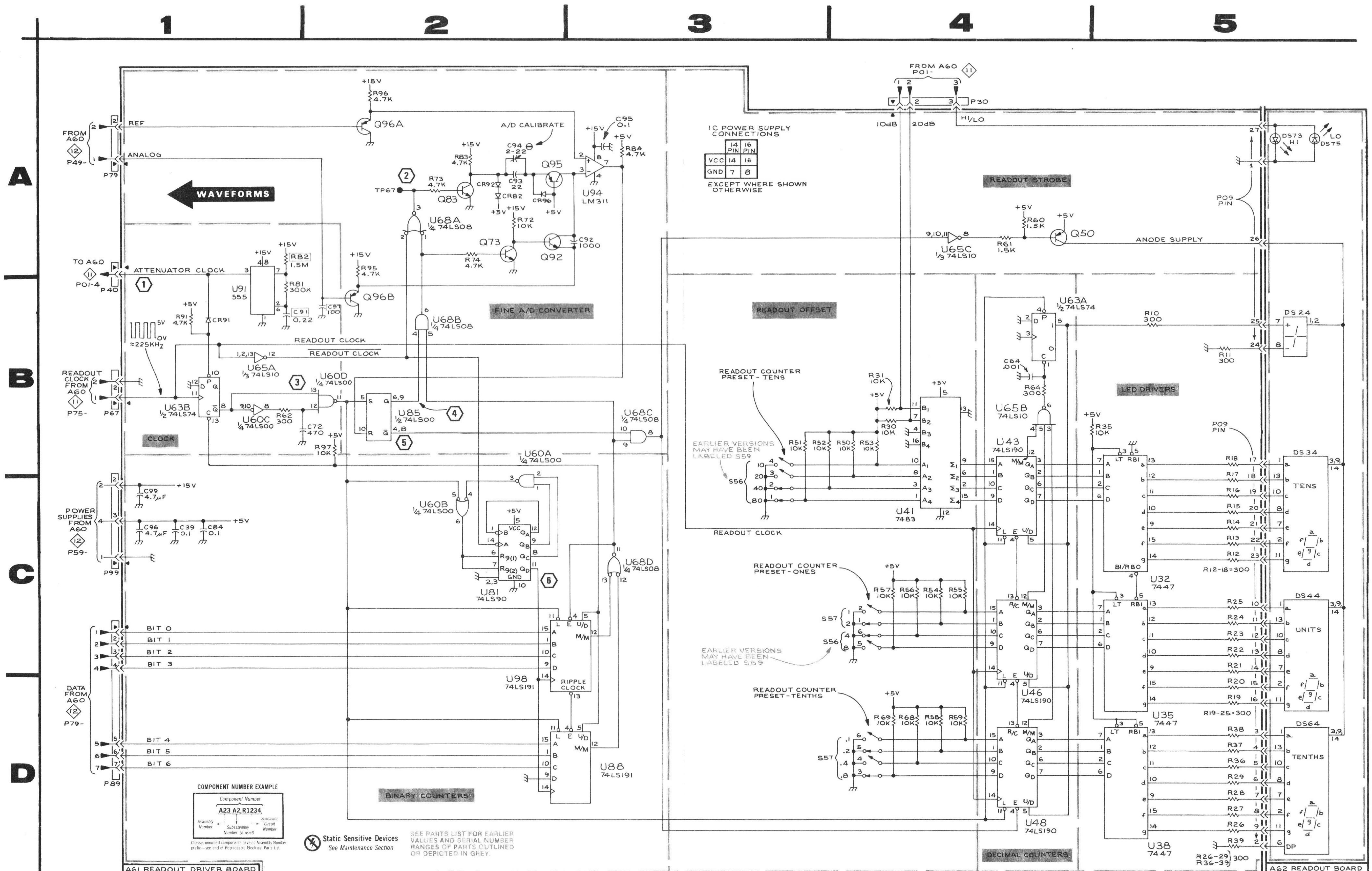
INTERNAL AC TRIGGER

6

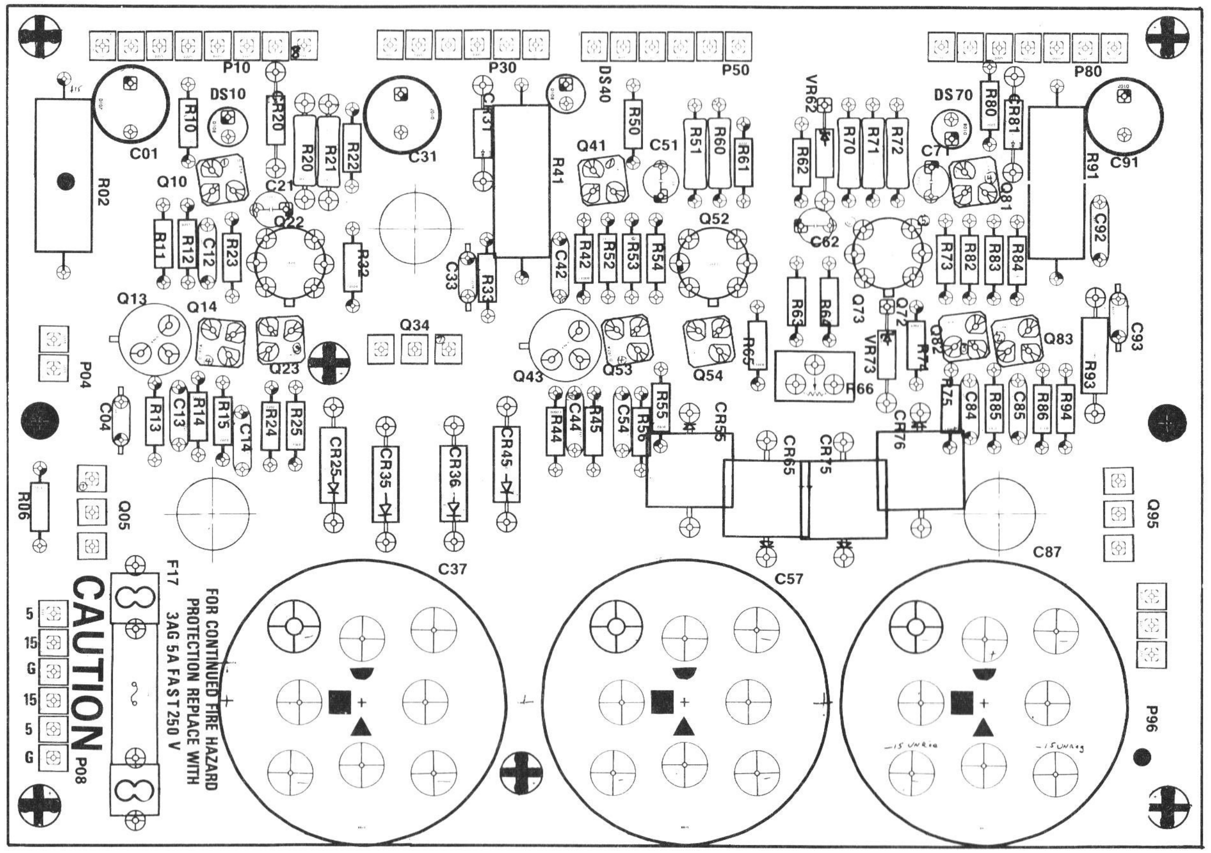


0 V

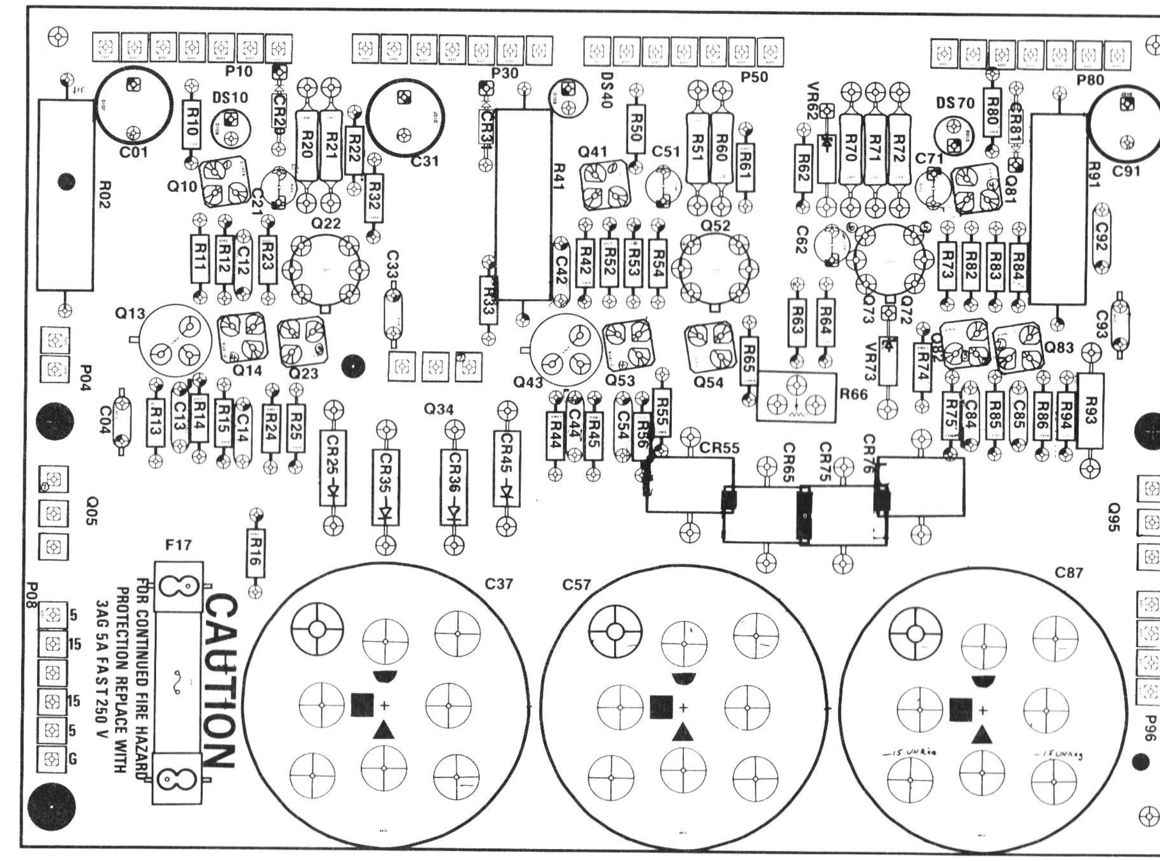
INTERNAL AC TRIGGER


WAVEFORMS
FROM A60 P49-
REF
ANALOG
TO A60 P01-4
ATTENUATOR CLOCK
READOUT CLOCK FROM A60 P75-
POWER SUPPLIES FROM A60 P59-
DATA FROM A60 P79-
BIT 0
BIT 1
BIT 2
BIT 3
BIT 4
BIT 5
BIT 6
A/D CALIBRATE
FINE A/D CONVERTER
CLOCK
BINARY COUNTERS
READOUT CLOCK
FROM A60 P01-
IC POWER SUPPLY CONNECTIONS
EXCEPT WHERE SHOWN OTHERWISE
READOUT STROBE
ANODE SUPPLY
READOUT OFFSET
READOUT COUNTER PRESET - TENS
READOUT COUNTER PRESET - ONES
READOUT COUNTER PRESET - TENTHS
EARLIER VERSIONS MAY HAVE BEEN LABELED S59
LED DRIVERS
DECIMAL COUNTERS
TENS
UNITS
TENTHS
R12-18=300
R19-25=300
COMPONENT NUMBER EXAMPLE
Static Sensitive Devices
See Maintenance Section
SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES OF PARTS OUTLINED OR DEPICTED IN GREY.
A61 READOUT DRIVER BOARD
A62 READOUT BOARD

A	B	C	D	E	F	G	H	I	J	K	L	M	N

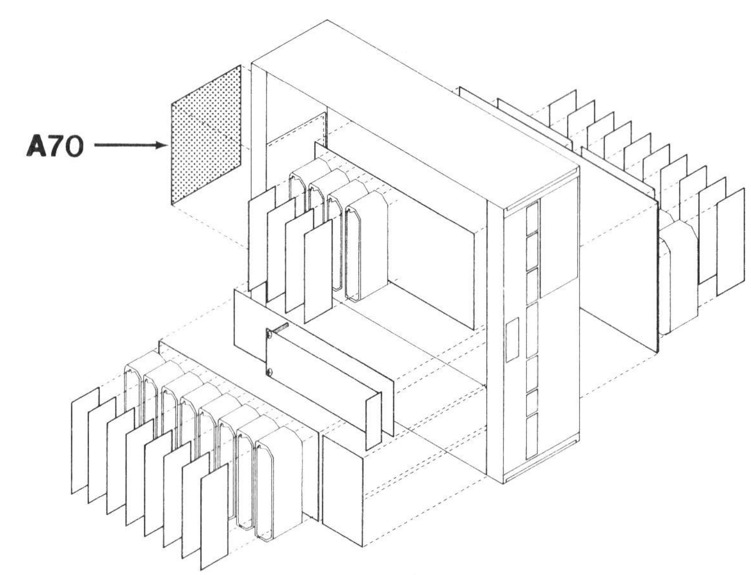


A70 POWER SUPPLY BOARD
(SN B010120—UP)



A70 POWER SUPPLY BOARD
(SN B000100—B000119)

Static Sensitive Devices
See Maintenance Section



COMPONENT NUMBER EXAMPLE

Component Number

A23 A2 R1234

Assembly Number — *Subassembly Number (if used)* — *Schematic Circuit Number*

Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

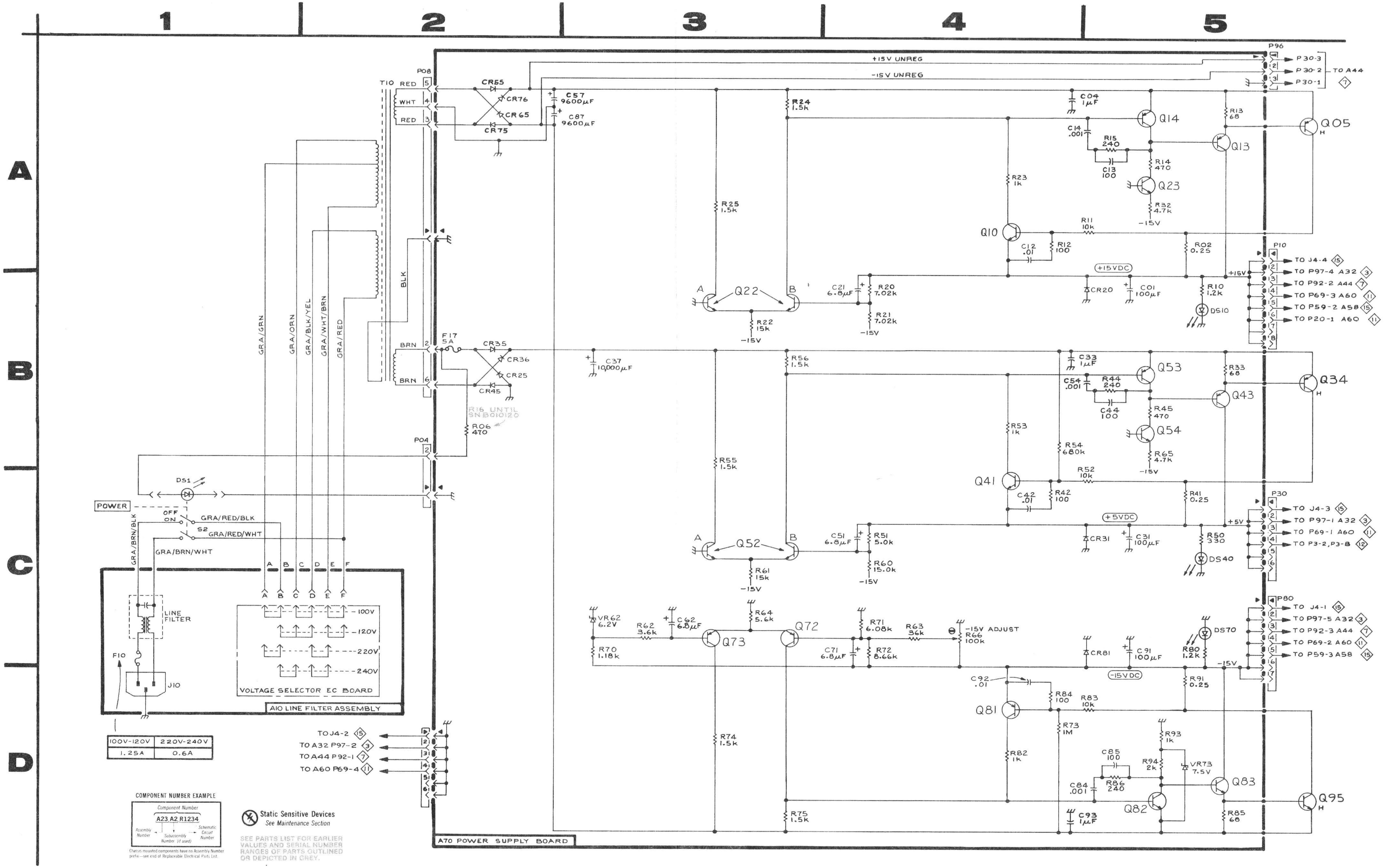
Power Supply ⟨14⟩

ASSY A70

Circuit Number	Schematic Location	Board Location
C01	B5	A1,I1
C04	A5	A3,I3
C12	A4	B2,J2
C13	A5	B3,I3
C14	A4	B3,J3
C21	B4	B2,J2
C31	C5	C1,J1
C33	B4	C2,J2
C37	B3	C4,K4
C42	C4	D2,K2
C44	B5	D3,K3
C51	C4	D2,L2
C54	B4	D3,L3
C57	A3	E4,L4
C62	C3	E2,M2
C71	C4	F1,M2
C84	D5	F3,M3
C85	D5	F3,N3
C87	A3	F4,N4
C91	C5	G1,N1
C92	D4	F2,N2
C93	D4	G2,N2
CR20	B5	B1,J1
CR25	B2	B3,J3
CR31	C5	C1,K1
CR35	B2	C3,J3
CR36	B2	C3,K3
CR45	B2	C3,K3
CR55	A2	D3,L3
CR65	A2	E3,L3
CR75	A2	E3,M3
CR76	A2	E3,M3
CR81	C5	F1,N1
DS10	B5	B1,J1
DS40	C5	D1,K1
DS70	C5	F1,M1
F17	B2	A4,I4
Q10	A4	B2,I2
Q13	A5	A2,I2
Q14	A5	B2,J3
Q22A	B3	B2,J2
Q22B	B3	B2,J2
Q23	A5	B2,J3
Q41	C4	D2,K2
Q43	B5	D3,K3
Q52A	C3	D2,L2
Q52B	C3	D2,L2
Q53	B5	D3,L3
Q54	B5	D3,L3
Q72	C3	E2,M2
Q73	C3	E2,M2
Q81	D4	F2,M2
Q82	D5	F3,M3
Q83	D5	F3,N3

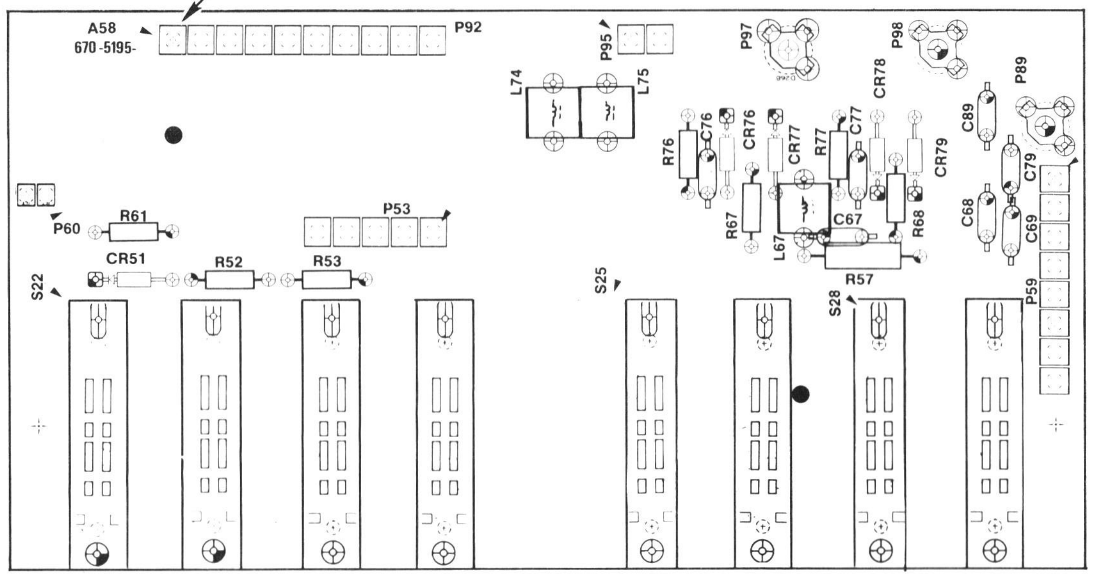
Circuit Number	Schematic Location	Board Location
R02	A5	A2,I2
R06	B2	A3
R10	B5	B1,I1
R11	A5	B2,I2
R12	A4	B2,J2
R13	A5	B3,I3
R14	A5	B3,I3
R15	A5	B3,J3
R16*	B2	J4
R20	B4	B1,J1
R21	B4	B1,J1
R22	B3	D2,J1
R23	A4	B2,J2
R24	A3	B3,J3
R25	A3	B3,J3
R32	A5	C2,J2
R33	B5	C2,K2
R41	C5	C2,K2
R42	C4	D2,K2
R44	B5	D3,K3
R45	B5	D3,K3
R50	C5	D1,L1
R51	C4	D1,L1
R52	C5	D2,L2
R53	B4	D2,L2
R54	B4	D2,L2
R55	B3	D3,L3
R56	B3	D3,L3
R60	C4	D1,L1
R61	C3	E2,L2
R62	C3	E2,M2
R63	C4	E2,M2
R64	C3	E2,M2
R65	B5	E3,L3
R66	C4	E3,M3
R70	C3	E1,M1
R71	C4	E1,M1
R72	C4	E1,M1
R73	D4	F2,M2
R74	D3	E3,M3
R75	D3	F3,M3
R80	C5	F1,M1
R82	D4	F2,M2
R83	D5	F2,M2
R84	D4	F2,N2
R85	D5	F3,N3
R86	D5	F3,N3
R91	D5	F2,N2
R93	D5	F3,N3
R94	D5	F3,N3
VR62	C3	E1,M1
VR73	D5	E3,M3

*** Note applicable serial number ranges for earlier board versions.**


1
2
3
4
5
A
B
C
D
+15V UNREG
-15V UNREG
P96
P30-3
P30-2
P30-1
TO A44
P08
T10
RED
WHT
CR55
CR76
CR65
CR75
C57 9600μF
C87 9600μF
R24 1.5k
R25 1.5k
C04 1μF
Q14
Q05
R13 68
Q13
C14 .001
R15 240
C13 100
R14 470
Q23
R23 1k
R32 4.7k
-15V
Q10
R11 10k
C12 .01
R12 100
R02 0.25
P10
TO J4-4
TO P97-4 A32
TO P92-2 A44
TO P69-3 A60
TO P59-2 A58
TO P20-1 A60
+15VDC
+15V
CR20
C01 100μF
R10 1.2k
DS10
Q22
C21 6.8μF
R20 7.02k
R21 7.02k
R22 15k
BLK
GRA/GRN
GRA/ORN
GRA/BLK/YEL
GRA/WHT/BRN
GRA/RED
BRN
F17 5A
CR35
CR36
CR25
CR45
C37 10,000μF
R56 1.5k
C33 1μF
Q53
R33 68
Q34
C54 .001
R44 240
C44 100
R45 470
Q43
Q54
R53 1k
R54 680k
R65 4.7k
R55 1.5k
Q41
R52 10k
C42 .01
R42 100
R41 0.25
P30
TO J4-3
TO P97-1 A32
TO P69-1 A60
TO P3-2, P3-8
+5VDC
+5V
CR31
C31 100μF
R50 330
DS40
Q52
C51 6.8μF
R51 5.0k
R60 15.0k
R61 15k
R16 UNTIL SN B010120
R06 470
P04
DS1
POWER
OFF
ON
S2
GRA/RED/BLK
GRA/RED/WHT
GRA/BRN/BLK
GRA/BRN/WHT
LINE FILTER
F10
J10
100V
120V
220V
240V
VOLTAGE SELECTOR EC BOARD
A10 LINE FILTER ASSEMBLY
VR62 6.2V
R62 3.6k
C62 6.8μF
R64 5.6k
Q73
Q72
R70 1.18k
R71 6.08k
R63 36k
-15V ADJUST R66 100k
C71 6.8μF
R72 8.66k
CR81
C91 100μF
R80 1.2k
DS70
P80
TO J4-1
TO P97-5 A32
TO P92-3 A44
TO P69-2 A60
TO P59-3 A58
-15VDC
C92 .01
R84 100
R83 10k
R91 0.25
Q81
R73 1M
R74 1.5k
R82 1k
R93 1k
C85 100
R94 2k
VR73 7.5V
Q83
C84 .001
R86 240
Q82
C93 1μF
R85 68
Q95
R75 1.5k
TO J4-2
TO A32 P97-2
TO A44 P92-1
TO A60 P69-4
A70 POWER SUPPLY BOARD
100V-120V
220V-240V
1.25A
0.6A
COMPONENT NUMBER EXAMPLE
Component Number
A23 A2 R1234
Assembly Number
Subassembly Number (if used)
Schematic Circuit Number
Static Sensitive Devices
See Maintenance Section
SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES OF PARTS OUTLINED OR DEPICTED IN GREY.

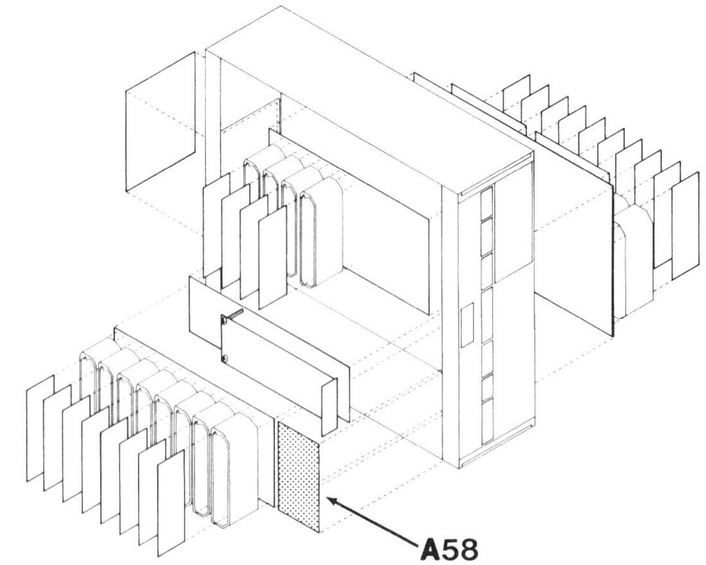
	A	B	C	D	E	F

Added at
SN B010120



1
2
3
4
5
6
7
8
9

A58 PHASE LOCK SWITCH



Static Sensitive Devices
See Maintenance Section

COMPONENT NUMBER EXAMPLE

Component Number

A23 A2 R1234

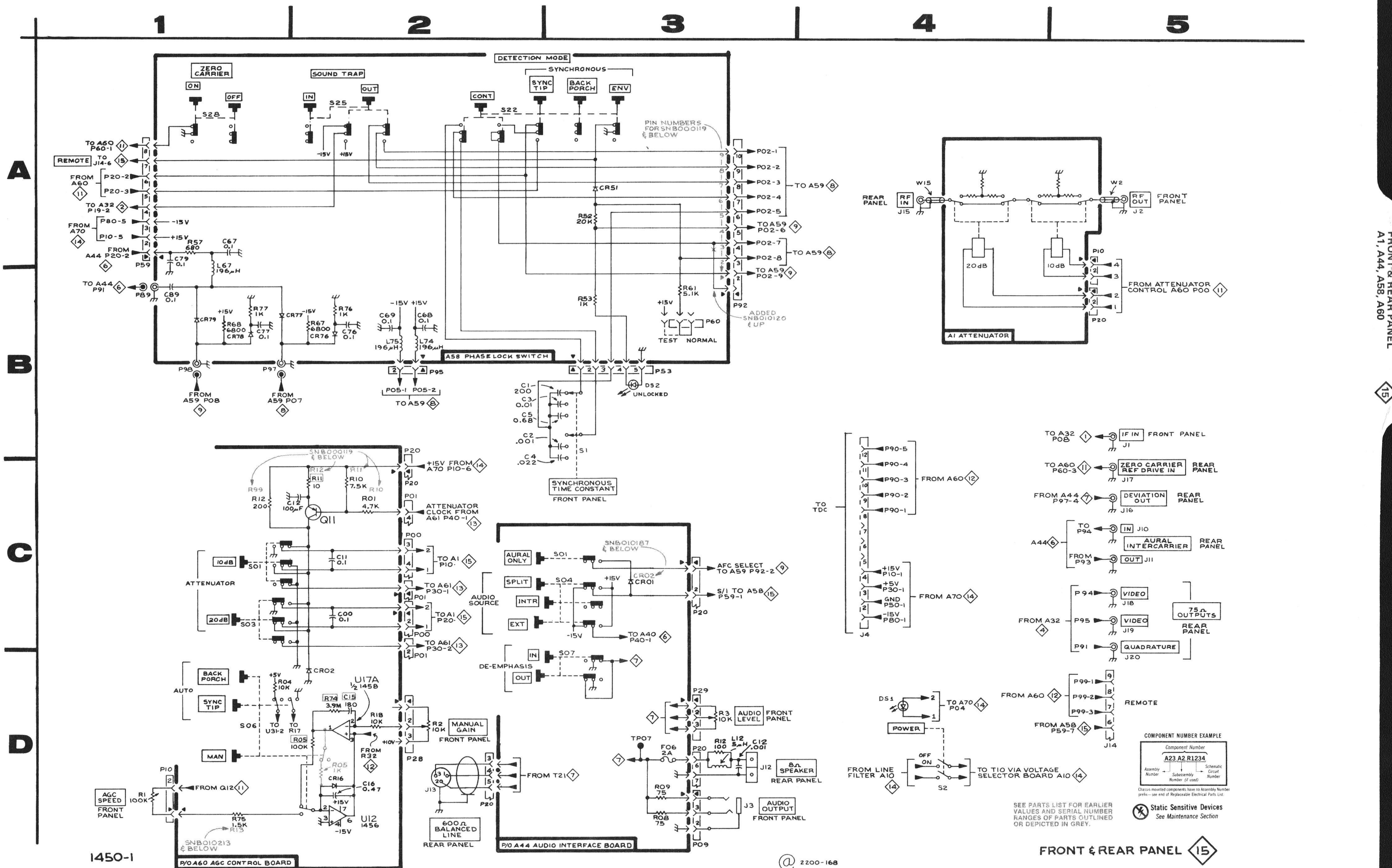
Assembly Number — *Subassembly Number (if used)* — *Schematic Circuit Number*

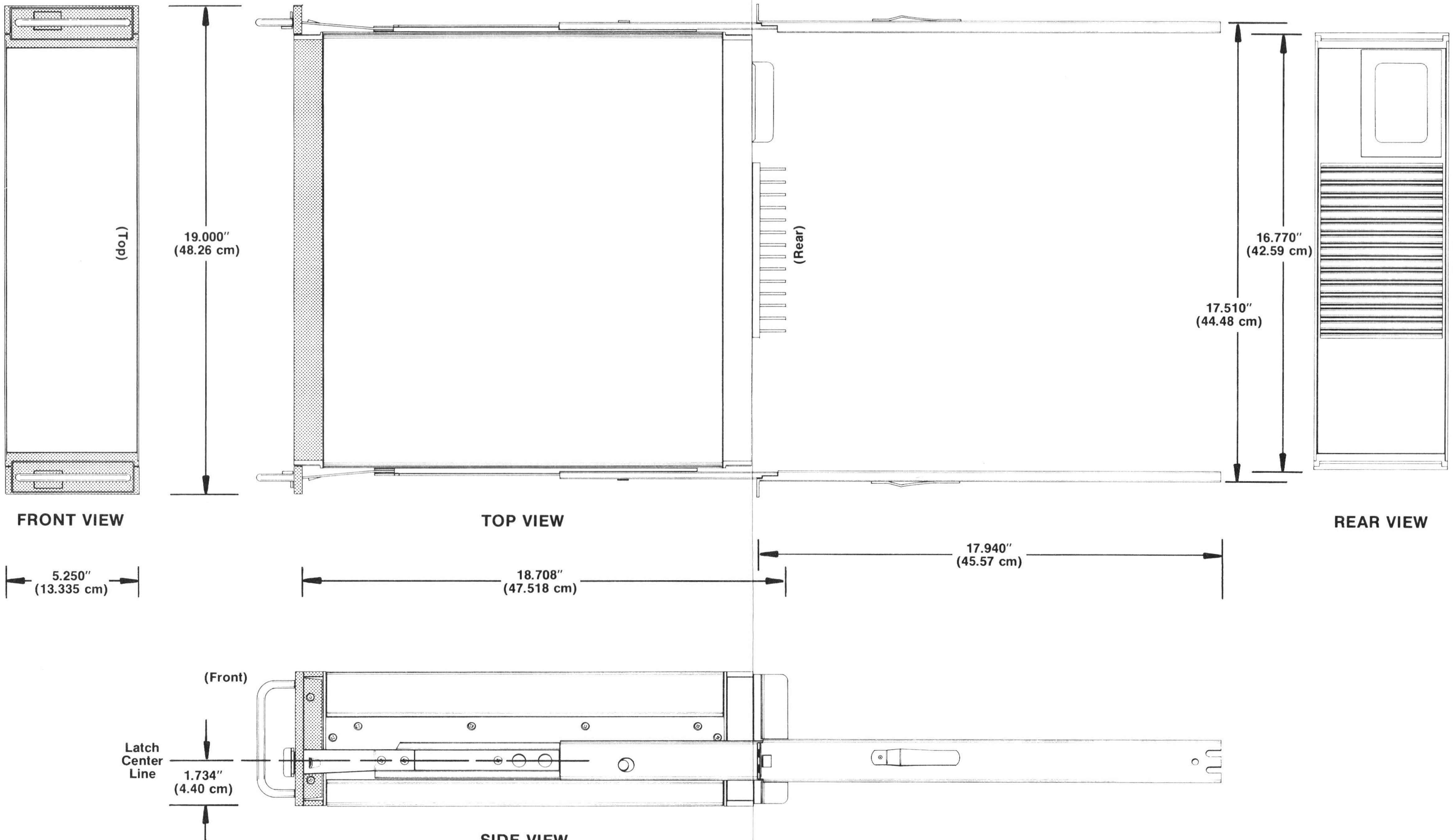
Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

Circuit Number	Schematic Location	Board Location
ASSY A58		
C67	A1	E2
C68	B2	F2
C69	B2	F2
C76	B2	D2
C77	B1	E2
C79	A1	F2
C89	B1	F1
CR51	A3	A2
CR76	B2	E1
CR77	B1	E1
CR78	B1	E1
CR79	B1	E2
L67	A1	E2
L74	B2	D1
L75	B2	D1
P60	B3	A2
P89	B1	F1
P97	B1	E1
P98	B1	E1
R52	A3	B2
R53	B3	B2
R57	A1	E2
R61	B3	A2
R67	B2	D2
R68	B1	E2
R76	B2	D2
R77	B1	E1
S22	A2	A2
S25	A2	D2
S28	A1	E2

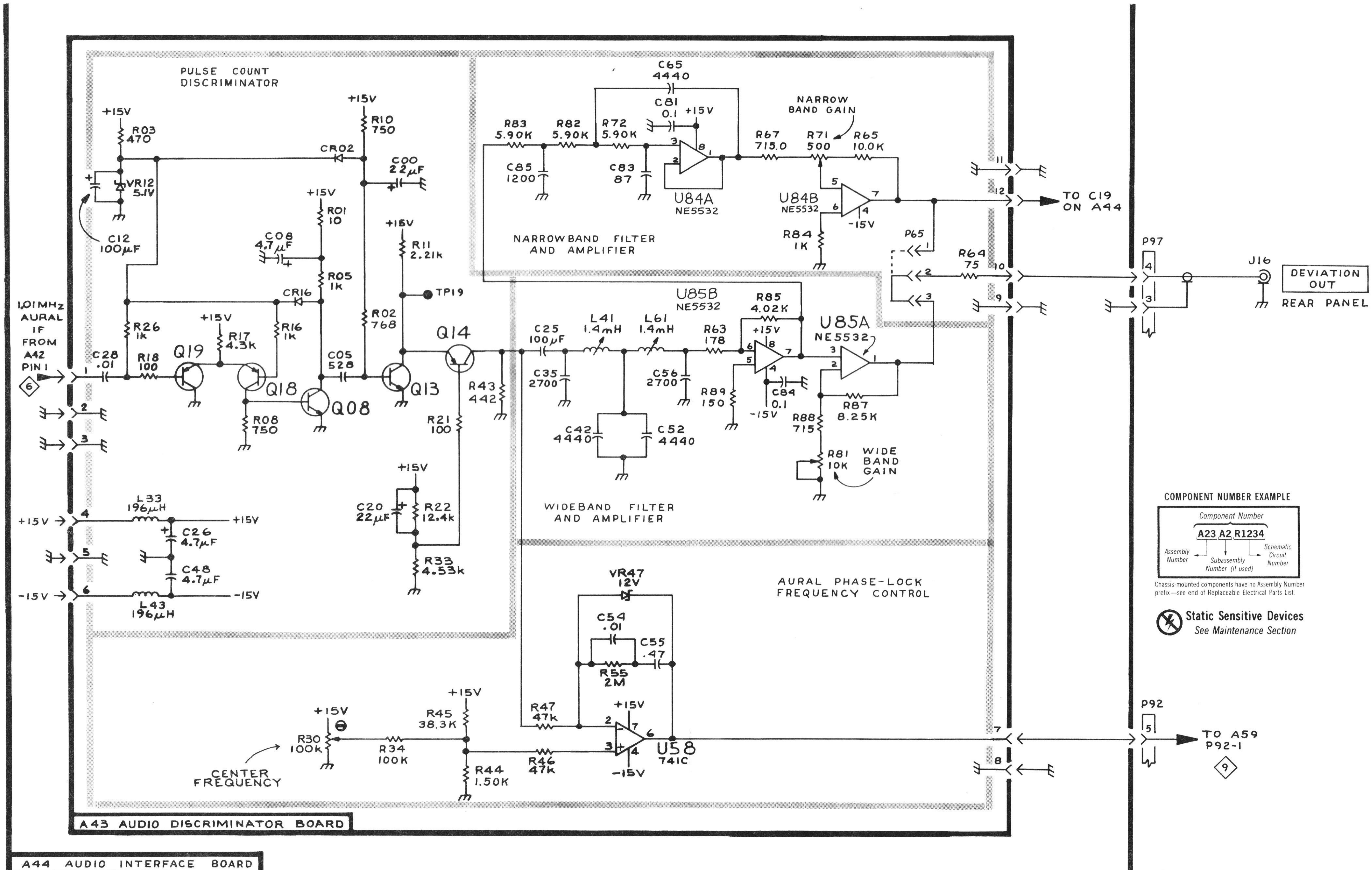
Front & Rear Panel (15)

2200-146


1450-1
FRONT & REAR PANEL 15
FRONT & REAR PANEL
A1, A44, A58, A60
2200-168


(Top)
19.000″
(48.26 cm)
(Rear)
16.770″
(42.59 cm)
17.510″
(44.48 cm)
(Bottom)
FRONT VIEW
TOP VIEW
REAR VIEW
5.250″
(13.335 cm)
18.708″
(47.518 cm)
17.940″
(45.57 cm)
(Front)
Latch
Center
Line
1.734″
(4.40 cm)
SIDE VIEW
2200-147

@


PULSE COUNT DISCRIMINATOR
NARROWBAND FILTER AND AMPLIFIER
WIDEBAND FILTER AND AMPLIFIER
AURAL PHASE-LOCK FREQUENCY CONTROL
1.01MHz AURAL IF FROM A42 PIN 1
NARROW BAND GAIN
WIDE BAND GAIN
CENTER FREQUENCY
TO C19 ON A44
DEVIATION OUT
REAR PANEL
TO A59 P92-1
A43 AUDIO DISCRIMINATOR BOARD
A44 AUDIO INTERFACE BOARD
U84A NE5532
U84B NE5532
U85A NE5532
U85B NE5532
U58 741C
Q19
Q18
Q08
Q13
Q14
TP19
VR12 5.1V
VR47 12V
R03 470
R10 750
R01 10
R05 1K
R11 2.21k
R02 768
R26 1K
R18 100
R17 4.3K
R16 1K
R08 750
R21 100
R43 442
R22 12.4k
R33 4.53k
R83 5.90K
R82 5.90K
R72 5.90K
R67 715.0
R71 500
R65 10.0K
R84 1K
R64 75
R85 4.02K
R63 178
R89 150
R88 715
R87 8.25K
R81 10K
R45 38.3K
R30 100k
R34 100K
R44 1.50K
R47 47k
R46 47k
R55 2M
CR02
CR16
C12 100μF
C08 4.7μF
C00 22μF
C28 .01
C05 528
C20 22μF
C26 4.7μF
C48 4.7μF
C65 4440
C81 0.1
C85 1200
C83 87
C25 100μF
C35 2700
C56 2700
C42 4440
C52 4440
C84 0.1
C54 .01
C55 .47
L33 196μH
L43 196μH
L41 1.4mH
L61 1.4mH
P65
P97
P92
J16
COMPONENT NUMBER EXAMPLE
Component Number
A23 A2 R1234
Assembly Number
Subassembly Number (if used)
Schematic Circuit Number
Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.
Static Sensitive Devices
See Maintenance Section

REPLACEABLE MECHANICAL PARTS

PARTS ORDERING INFORMATION

Replacement parts are available from or through your local Tektronix, Inc. Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc. Field Office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

SPECIAL NOTES AND SYMBOLS

X000 Part first added at this serial number

00X Part removed after this serial number

FIGURE AND INDEX NUMBERS

Items in this section are referenced by figure and index numbers to the illustrations.

INDENTATION SYSTEM

This mechanical parts list is indented to indicate item relationships. Following is an example of the indentation system used in the description column.

1 2 3 4 5 Name & Description

Assembly and/or Component
Attaching parts for Assembly and/or Component
--- * ---
Detail Part of Assembly and/or Component
Attaching parts for Detail Part
--- * ---
Parts of Detail Part
Attaching parts for Parts of Detail Part
--- * ---

Attaching Parts always appear in the same indentation as the item it mounts, while the detail parts are indented to the right. Indented items are part of, and included with, the next higher indentation. The separation symbol --- * --- indicates the end of attaching parts.

Attaching parts must be purchased separately, unless otherwise specified.

ITEM NAME

In the Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, the U.S. Federal Cataloging Handbook H6-1 can be utilized where possible.

ABBREVIATIONS

"	INCH
#	NUMBER SIZE
ACTR	ACTUATOR
ADPTR	ADAPTER
ALIGN	ALIGNMENT
AL	ALUMINUM
ASSEM	ASSEMBLED
ASSY	ASSEMBLY
ATTEN	ATTENUATOR
AWG	AMERICAN WIRE GAGE
BD	BOARD
BRKT	BRACKET
BRS	BRASS
BRZ	BRONZE
BSHG	BUSHING
CAB	CABINET
CAP	CAPACITOR
CER	CERAMIC
CHAS	CHASSIS
CKT	CIRCUIT
COMP	COMPOSITION
CONN	CONNECTOR
COV	COVER
CPLG	COUPLING
CRT	CATHODE RAY TUBE
DEG	DEGREE
DWR	DRAWER
ELCTRN	ELECTRON
ELEC	ELECTRICAL
ELCTLT	ELECTROLYTIC
ELEM	ELEMENT
EPL	ELECTRICAL PARTS LIST
EQPT	EQUIPMENT
EXT	EXTERNAL
FIL	FILLISTER HEAD
FLEX	FLEXIBLE
FLH	FLAT HEAD
FLTR	FILTER
FR	FRAME or FRONT
FSTNR	FASTENER
FT	FOOT
FXD	FIXED
GSKT	GASKET
HDL	HANDLE
HEX	HEXAGON
HEX HD	HEXAGONAL HEAD
HEX SOC	HEXAGONAL SOCKET
HLCPS	HELICAL COMPRESSION
HLEXT	HELICAL EXTENSION
HV	HIGH VOLTAGE
IC	INTEGRATED CIRCUIT
ID	INSIDE DIAMETER
IDENT	IDENTIFICATION
IMPLR	IMPELLER
IN	INCH
INCAND	INCANDESCENT
INSUL	INSULATOR
INTL	INTERNAL
LPHLDR	LAMPHOLDER
MACH	MACHINE
MECH	MECHANICAL
MTG	MOUNTING
NIP	NIPPLE
NON WIRE	NOT WIRE WOUND
OBD	ORDER BY DESCRIPTION
OD	OUTSIDE DIAMETER
OVH	OVAL HEAD
PH BRZ	PHOSPHOR BRONZE
PL	PLAIN or PLATE
PLSTC	PLASTIC
PN	PART NUMBER
PNH	PAN HEAD
PWR	POWER
RCPT	RECEPTACLE
RES	RESISTOR
RGD	RIGID
RLF	RELIEF
RTNR	RETAINER
SCH	SOCKET HEAD
SCOPE	OSCILLOSCOPE
SCR	SCREW
SE	SINGLE END
SECT	SECTION
SEMICOND	SEMICONDUCTOR
SHLD	SHIELD
SHLDR	SHOULDERED
SKT	SOCKET
SL	SLIDE
SLFLKG	SELF-LOCKING
SLVG	SLEEVING
SPR	SPRING
SQ	SQUARE
SST	STAINLESS STEEL
STL	STEEL
SW	SWITCH
T	TUBE
TERM	TERMINAL
THD	THREAD
THK	THICK
TNSN	TENSION
TPG	TAPPING
TRH	TRUSS HEAD
V	VOLTAGE
VAR	VARIABLE
W/	WITH
WSHR	WASHER
XFMR	TRANSFORMER
XSTR	TRANSISTOR

CROSS INDEX—MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip
000AH	STANDARD PRESSED STEEL CO., UNBRAKO DIV.	8535 DICE ROAD	SANTA FE SPRINGS, CA 90670
000BK	STAUFFER SUPPLY	105 SE TAYLOR	PORTLAND, OR 97214
000CB	PALM ABRASIVE AND TOOL COMPANY	825 SE BELMONT	PORTLAND, OR 97214
000CY	NORTHWEST FASTENER SALES, INC.	7923 SW CIRRUS DRIVE	BEAVERTON, OR 97005
00779	AMP, INC.	P.O. BOX 3608	HARRISBURG, PA 17105
01295	TEXAS INSTRUMENTS, INC. SEMICONDUCTOR GROUP	P.O. BOX 5012	DALLAS, TX 75222
02777	HOPKINS ENGINEERING COMPANY	12900 FOOTHILL BLVD.	SAN FERNANDO, CA 91342
06383	PANDUIT CORPORATION	17301 RIDGELAND	TINLEY PARK, IL 60477
06540	AMATOM ELECTRONIC HARDWARE, DIV. OF MITE CORP.	446 BLAKE ST.	NEW HAVEN, CT 06515
06666	GENERAL DEVICES CO., INC.	525 S. WEBSTER AVE.	INDIANAPOLIS, IN 46219
07707	USM CORP., USM FASTENER DIV.	510 RIVER RD.	SHELTON, CT 06484
08261	SPECTRA-STRIP CORP.	7100 LAMPSON AVE.	GARDEN GROVE, CA 92642
09922	BURNDY CORPORATION	RICHARDS AVENUE	NORWALK, CT 06852
11897	PLASTIGLIDE MFG. CORPORATION	P O BOX 867, 1757 STANFORD ST.	SANTA MONICA, CA 90406
12089	BEAV MOTOR DIVISION UMC ELECTRONICS CO.	460 SACKETT POINT RD.	NORTH HAVEN, CT 06473
12300	POTTER AND BRUMFIELD, DIV. AMF CANADA LTD.	52 ROYAL ROAD, P O BOX 698	GUELPH, ONTARIO, CANADA
12327	FREEWAY CORPORATION	9301 ALLEN DRIVE	CLEVELAND, OH 44125
14566	COORS PORCELAIN COMPANY	600 9TH STREET	GOLDEN, CO 80401
22526	BERG ELECTRONICS, INC.	YOUK EXPRESSWAY	NEW CUMBERLAND, PA 17070
26742	METHODE ELECTRONICS INC.	7447 W. WILSON AVE.	CHICAGO, ILL 60656
30817	INSTRUMENT SPECIALTIES COMPANY, INC.		LITTLE FALLS,NJ 07424
31781	EDAC INC.	20 RAILSIDE RD.	DON MILLS, ONT, CANADA M3A 1
71468	ITT CANNON ELECTRIC	666 E. DYER RD.	SANTA ANA, CA 92702
71590	CENTRALAB ELECTRONICS, DIV. OF GLOBE-UNION, INC.	P O BOX 858	FORT DODGE, IA 50501
71785	TRW, CINCH CONNECTORS	1501 MORSE AVENUE	ELK GROVE VILLAGE, IL 60007
73743	FISCHER SPECIAL MFG. CO.	446 MORGAN ST.	CINCINNATI, OH 45206
75915	LITTELFUSE, INC.	800 E. NORTHWEST HWY	DES PLAINES, IL 60016
78189	ILLINOIS TOOL WORKS, INC. SHAKEPROOF DIVISION	ST. CHARLES ROAD	ELGIN, IL 60120
78471	TILLEY MFG. CO.	900 INDUSTRIAL RD.	SAN CARLOS, CA 94070
79807	WROUGHT WASHER MFG. CO.	2100 S. O BAY ST.	MILWAUKEE, WI 53207
80009	TEKTRONIX, INC.	P O BOX 500	BEAVERTON, OR 97077
82389	SWITCHCRAFT, INC.	5555 N. ELSTON AVE.	CHICAGO, IL 60630
83385	CENTRAL SCREW CO.	2530 CRESCENT DR.	BROADVIEW, IL 60153
86445	PENN FIBRE AND SPECIALTY CO., INC.	2032 E. WESTMORELAND ST.	PHILADELPHIA, PA 19134
86928	SEASTROM MFG. COMPANY, INC.	701 SONORA AVENUE	GLENDALE, CA 91201
91506	AUGAT, INC.	33 PERRY AVE.	ATTLEBORO, MA 02703
91836	KINGS ELECTRONICS CO., INC.	40 MARBLEDALE ROAD	TUCKAHOE, NY 10707
93907	TEXTRON INC. CAMCAR DIV	600 18TH AVE	ROCKFORD, IL 61101
95987	WECKESSER CO., INC.	4444 WEST IRVING PARK RD.	CHICAGO, IL 60641
S3109	C/O PANEL COMPONENTS CORP.	P.O. BOX 6626	SANTA ROSA, CA 95406
T1105	J PHILLIP INDUSTRIES INC	5713 NORTHWEST HIGHWAY	CHICAGO, IL 60646
T1372	ELECTRI-CORD MFG CO INC	312 E. MAIN ST.	WESTFIELD, PA 16950

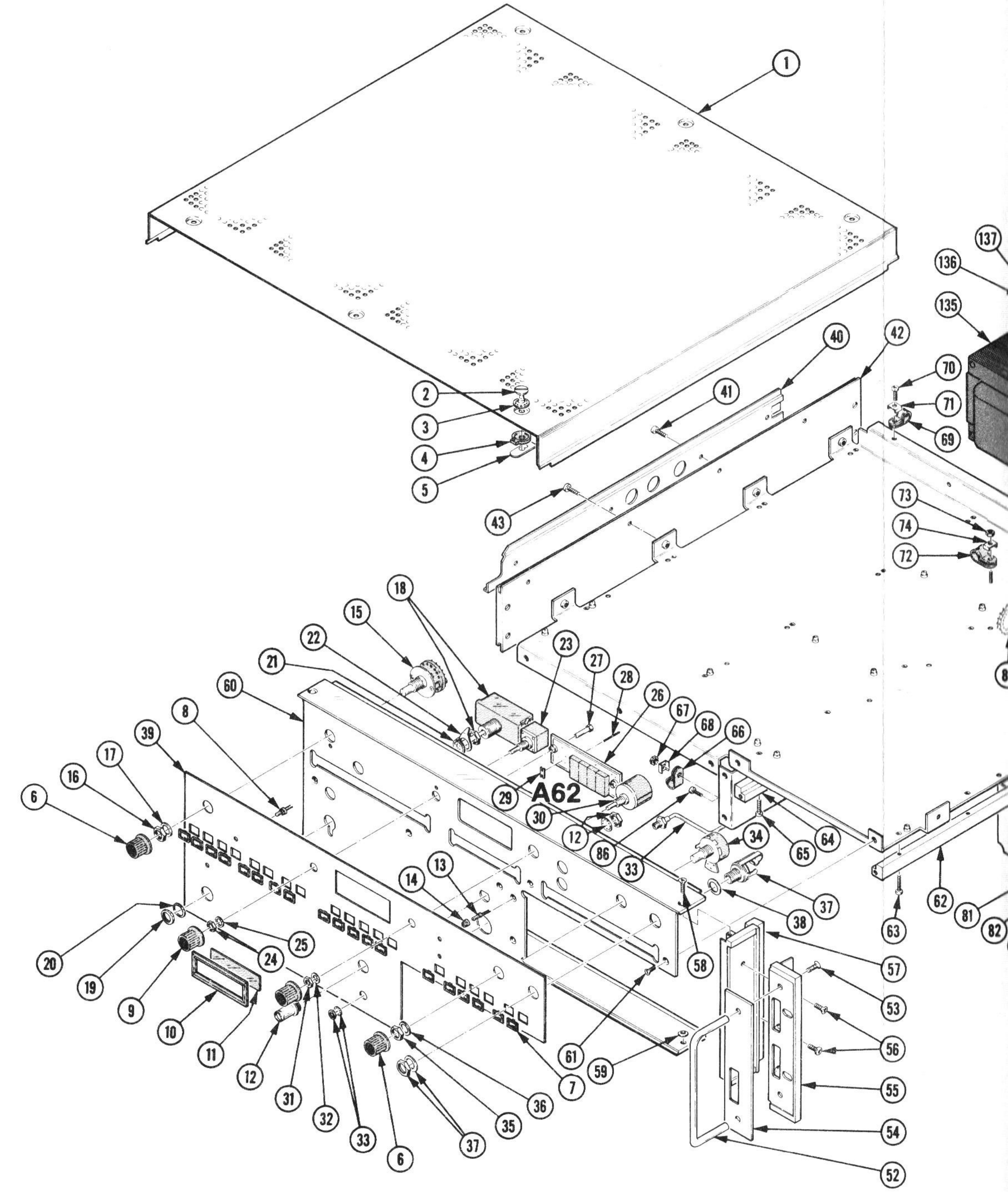
Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
1-1	390-0585-00			1	CABINET TOP:	80009	390-0585-00
	390-0586-00			1	CABINET BOTTOM:	80009	390-0586-00
	214-0603-02			6	.PIN ASSY,SECRG:	80009	214-0603-02
-2	214-0603-01			6	..PIN,SECURING:0.27 INCH LONG	80009	214-0603-01
-3	214-0604-00			6	..WASH.,SPG TNSN:0.26 ID X 0.47 INCH OD	80009	214-0604-00
-4	386-0227-04			6	.STOP,CLP,RIM CL:SIL GY DELRIN	80009	386-0227-04
-5	386-1151-00			6	.CLAMP,RIM CLENC:SPG STL CD PL	80009	386-1151-00
-6	366-1024-00			2	KNOB:GY,0.252 ID X 0.706 OD X 0.	80009	366-1024-00
	213-0153-00			4	.SETSCREW:5-40 X 0.125,STL BK OXD,HEX	000CY	ORD BY DESCR
-7	426-0681-00			19	FR,PUSH BUTTON:GRAY PLASTIC	80009	426-0681-00
-8	----- -----			1	LED:(SEE DS1 REPL)		
-9	366-0497-00			2	KNOB:GY,0.127 ID X 0.706 OD	80009	366-0497-00
	213-0153-00			2	.SETSCREW:5-40 X 0.125,STL BK OXD,HEX	000CY	ORD BY DESCR
-10	426-0916-00			1	FRAME,RDOUT WDO:	80009	426-0916-00
-11	331-0314-00			1	WINDOW,READOUT:RED	80009	331-0314-00
-12	131-1315-00			8	REPLACED BY:31-1315-01		
-13	----- -----			3	LED:(SEE DS2,DS3,DS4 REPL)		
-14	352-0451-00			3	HOLDER,LENS:0.125 ID,PLASTIC	80009	352-0451-00
-15	----- -----			1	SWITCH,ROTARY:(SEE S1 REPL)		
					**************(ATTACHING PARTS)***********		
-16	210-0978-00			1	WASHER,FLAT:0.375 ID X 0.50 INCH OD,STL	78471	ORD BY DESCR
-17	210-0590-00			1	NUT,PLAIN,HEX.:0.375-32 X 0.438" BRS	73743	2X28269-402
					************(END ATTACHING PARTS)*********		
-18	----- -----			1	SWITCH,TOGGLE:(SEE S2 REPL)		
					**************(ATTACHING PARTS)***********		
-19	210-0473-01			1	NUT,PLAIN,DODEC:0.469-32 X 0.638,BRASS	80009	210-0473-01
-20	210-0902-01			1	WASHER,FLAT:0.47 ID X 0.03 THK,STEEL	80009	210-0902-01
-21	354-0055-00			1	WASHER,KEY:0.469 ID X 0.688 INCH OD,ST	80009	354-0055-00
-22	210-0241-00			1	TERMINAL,LUG:0.515 ID X 0.625 INCH OD SE	80009	210-0241-00
					************(END ATTACHING PARTS)*********		
-23	----- -----			1	RES.,VAR:100K OHM (SEE R1 REPL)		
					**************(ATTACHING PARTS)***********		
-24	210-0583-00			1	NUT,PLAIN,HEX:0.25-32 X 0.312 INCH,BRS	73743	2X20317-402
-25	210-0940-00			1	WASHER,FLAT:0.25 ID X 0.375 INCH OD,STL	79807	ORD BY DESCR
					************(END ATTACHING PARTS)*********		
-26	----- -----			1	CKT BOARD ASSY:A.G.C. READOUT		
	----- -----			-	(SEE A62 REPL)		
					**************(ATTACHING PARTS)***********		
-27	220-0413-00			2	NUT,SLEEVE:4-40 X 0.562 INCH LONG	80009	220-0413-00
					************(END ATTACHING PARTS)*********		
	----- -----			-	CKT BOARD ASSY INCLUDES:		
-28	131-0589-00			27	.TERMINAL,PIN:0.46 L X 0.025 SQ	22526	48283-029
-29	361-0411-00			2	.SPACER,PUSH SW:0.13 W X 0.375 INCH L,PLST	71590	J64285-00
-30	----- -----			1	RES.,VAR:10K OHM (SEE R2 REPL)		
					**************(ATTACHING PARTS)***********		
-31	210-0583-00			1	NUT,PLAIN,HEX:0.25-32 X 0.312 INCH,BRS	73743	2X20317-402
-32	210-0940-00			1	WASHER,FLAT:0.25 ID X 0.375 INCH OD,STL	79807	ORD BY DESCR
					************(END ATTACHING PARTS)*********		
-33	175-2079-00			1	CABLE ASSY,RF:50 OHM COAX,16.0 L	80009	175-2079-00
-34	----- -----			1	RES.,VAR:10K OHM (SEE R3 REPL)		
					**************(ATTACHING PARTS)***********		
-35	210-0590-00			1	NUT,PLAIN,HEX.:0.375-32 X 0.438" BRS	73743	2X28269-402
-36	210-0978-00			1	WASHER,FLAT:0.375 ID X 0.50 INCH OD,STL	78471	ORD BY DESCR
					************(END ATTACHING PARTS)*********		
-37	131-2006-00	B000100	B010435	1	JACK,TELEPHONE:PANEL MOUNT,3 CONDUCTOR	82389	12B
	131-0267-00	B010436		1	JACK,TELEPHONE:3 CONDUCTOR	82389	12B
-38	210-0012-00	B010173		1	WASHER,LOCK:INTL,0.384 ID,INTL,0.022 TH	78189	1220-02-00-0541C
-39	333-2316-00	B000100	B010379	1	PANEL,FRONT:	80009	333-2316-00
	----- -----			-	(1450 ONLY)		
	333-2584-00	B010380		1	PANEL,FRONT:	80009	333-2584-00
	----- -----			-	(1450 ONLY)		

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
1-40	351-0104-03			1	SLIDE SECT,DWR:12.625 L,W/O HARDWARE	06666	C-720-3
					*************(ATTACHING PARTS)***********		
-41	212-0023-00	B000100	B000119	4	SCREW,MACHINE:8-32 X 0.375,PNH,STL CD PL	83385	ORD BY DESCR
	212-0008-00	B010120		4	SCREW,MACHINE:8-32 X 0.500 INCH,PNH STL	83385	ORD BY DESCR
					***********(END ATTACHING PARTS)*********		
-42	426-1406-00			1	FRAME SECT,CAB.:LEFT	80009	426-1406-00
					*************(ATTACHING PARTS)***********		
-43	211-0507-00			4	SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL	83385	ORD BY DESCR
					***********(END ATTACHING PARTS)*********		
-44	366-1729-00			2	KNOB:GRAY,LATCH	80009	366-1729-00
-45	214-2558-00			2	SPRING,FLAT:CHASSIS TRACK LOCK	80009	214-2558-00
					*************(ATTACHING PARTS)***********		
-46	212-0008-00			4	SCREW,MACHINE:8-32 X 0.500 INCH,PNH STL	83385	ORD BY DESCR
-47	210-1266-00			4	WASHER,FLAT:0.193 ID X 0.475 OD X 0.007	86928	5702-79-75
					***********(END ATTACHING PARTS)*********		
-48	351-0104-03			1	SLIDE SECT,DWR:12.625 L,W/O HARDWARE	06666	C-720-3
					*************(ATTACHING PARTS)***********		
-49	212-0023-00	B000100	B000119	6	SCREW,MACHINE:8-32 X 0.375,PNH,STL CD PL	83385	ORD BY DESCR
	212-0141-00	B010120	B010768	6	SCREW,MACHINE:8-32 X 0.562,PNH,STEEL	93907	ORD BY DESCR
	212-0142-00	B010769		6	SCREW,MACHINE:8-32 X 0.437,PNH,STL CD PL	93907	ORD BY DESCR
					***********(END ATTACHING PARTS)*********		
-50	426-1407-00			1	FRAME SECT,CAB.:RIGHT	80009	426-1407-00
					*************(ATTACHING PARTS)***********		
-51	211-0507-00			4	SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL	83385	ORD BY DESCR
					***********(END ATTACHING PARTS)*********		
-52	367-0104-00			2	HANDLE,BOW:4.076 L,AL CRPL	80009	367-0104-00
					*************(ATTACHING PARTS)***********		
-53	212-0518-00	B000100	B000119	4	SCREW,MACHINE:10-32 X 0.312,PNH,STL,CD PL	83385	ORD BY DESCR
	212-0574-00	B010120		8	SCREW,MACHINE:10-32 X 0.438"100 DEG FLH S	83385	ORD BY DESCR
					***********(END ATTACHING PARTS)*********		
-54	386-3723-00			2	PLATE,TRIM:FRONT	80009	386-3723-00
-55	407-0570-04			2	BRACKET,ANGLE:FRONT,RIGHT & LEFT,AL	80009	407-0570-04
					*************(ATTACHING PARTS)***********		
-56	212-0043-00			4	SCREW,MACHINE:8-32 X 0.500 INCH,FLH STL	83385	ORD BY DESCR
					***********(END ATTACHING PARTS)*********		
-57	426-0482-09			2	FRAME SECT,CAB.:UPRIGHT,REAR CORNER	80009	426-0482-09
					*************(ATTACHING PARTS)***********		
-58	212-0506-00			4	SCREW,MACHINE:10-32 X 0.375 INCH,FLH STL	83385	ORD BY DESCR
					***********(END ATTACHING PARTS)*********		
-59	210-0804-00			1	WASHER,FLAT:0.17 ID X 0.375 INCH OD,STL	12327	ORD BY DESCR
-60	386-3721-00			1	SUBPANEL,FRONT:	80009	386-3721-00
					*************(ATTACHING PARTS)***********		
-61	211-0025-00			7	SCREW,MACHINE:4-40 X 0.375 100 DEG,FLH ST	83385	ORD BY DESCR
					***********(END ATTACHING PARTS)*********		
-62	351-0534-00			1	SLIDE,GUIDE:PLUG-IN,RIGHT	80009	351-0534-00
					*************(ATTACHING PARTS)***********		
-63	211-0016-00	B000100	B000119	4	SCREW,MACHINE:4-40 X 0.625 INCH,PNH STL	83385	ORD BY DESCR
	211-0164-00	B010120		4	SCREW,CAP,SCH:4-40 X 0.625 INCH,L STL	83385	ORD BY DESCR
					***********(END ATTACHING PARTS)*********		
-64	351-0539-00			1	SLIDE,GUIDE:PLUG-IN,LEFT	80009	351-0539-00
					*************(ATTACHING PARTS)***********		
-65	211-0016-00	B000100	B000119	4	SCREW,MACHINE:4-40 X 0.625 INCH,PNH STL	83385	ORD BY DESCR
	211-0164-00	B010120		4	SCREW,CAP,SCH:4-40 X 0.625 INCH,L STL	83385	ORD BY DESCR
					***********(END ATTACHING PARTS)*********		
-66	343-0001-00			2	CLAMP,LOOP:0.15 INCH DIA,PLASTIC	95987	1-8-6B
					*************(ATTACHING PARTS)***********		
-67	210-0457-00			2	NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL	83385	ORD BY DESCR
-68	210-0863-00			2	WSHR,LOOP CLAMP:0.187 ID U/W 0.5 W CLP,STL	95987	C191
					***********(END ATTACHING PARTS)*********		
-69	343-0013-00			2	CLAMP,LOOP:0.375 ID,PLASTIC	95987	3-8-6B
					*************(ATTACHING PARTS)***********		
-70	211-0507-00	B000100	B010657	2	SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL	83385	ORD BY DESCR
	211-0511-00	B010658		2	SCREW,MACHINE:6-32 X 0.500,PNH,STL,CD PL	83385	ORD BY DESCR

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
1-71	210-0863-00	B000100	B010657	2	WSHR,LOOP CLAMP:0.187 ID U/W 0.5 W CLP,STL	95987	C191
	210-0005-00	B010658		2	WASHER,LOCK:#6 EXT,0.02 THK,STL	78189	1106-00
					************(END ATTACHING PARTS)*********		
	210-0778-01	B010658		2	EYELET,METALLIC:0.163 OD X 0.15 INCH L,BRS	80009	210-0778-01
	210-0601-01	B010658		2	EYELET,METALLIC:0.183 OD X 0.192 L,BRS	80009	210-0601-01
-72	343-0005-00			2	CLAMP,LOOP:0.438 INCH	95987	7-16-6B
					**************(ATTACHING PARTS)***********		
-73	210-0457-00			2	NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL	83385	ORD BY DESCR
-74	210-0863-00	B000100	B010657	2	WSHR,LOOP CLAMP:0.187 ID U/W 0.5 W CLP,STL	95987	C191
	210-0005-00	B010658		2	WASHER,LOCK:#6 EXT,0.02 THK,STL	78189	1106-00
	210-0778-01	B010658		2	EYELET,METALLIC:0.163 OD X 0.15 INCH L,BRS	80009	210-0778-01
	210-0601-01	B010658		2	EYELET,METALLIC:0.183 OD X 0.192 L,BRS	80009	210-0601-01
					************(END ATTACHING PARTS)*********		
-75	343-0007-00			1	CLAMP,LOOP:	95987	5-8-6B
					**************(ATTACHING PARTS)***********		
-76	211-0507-00	B000100	B010657	1	SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL	83385	ORD BY DESCR
	211-0511-00	B010658		1	SCREW,MACHINE:6-32 X 0.500,PNH,STL,CD PL	83385	ORD BY DESCR
-77	210-0863-00			1	WSHR,LOOP CLAMP:0.187 ID U/W 0.5 W CLP,STL	95987	C191
	210-0005-00	B010658		1	WASHER,LOCK:#6 EXT,0.02 THK,STL	78189	1106-00
	210-0778-01	B010658		1	EYELET,METALLIC:0.163 OD X 0.15 INCH L,BRS	80009	210-0778-01
	210-0601-01	B010658		1	EYELET,METALLIC:0.183 OD X 0.192 L,BRS	80009	210-0601-01
					************(END ATTACHING PARTS)*********		
-78	343-0002-00	B010189		1	CLAMP,LOOP:0.188 INCH DIA	95987	3-16-6B
					**************(ATTACHING PARTS)***********		
-79	211-0507-00	B010189	B010657	1	SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL	83385	ORD BY DESCR
	211-0511-00	B010658		1	SCREW,MACHINE:6-32 X 0.500,PNH,STL,CD PL	83385	ORD BY DESCR
-80	210-0863-00	B010189	B010678	1	WSHR,LOOP CLAMP:0.187 ID U/W 0.5 W CLP,STL	95987	C191
	210-0005-00	B010658		1	WASHER,LOCK:#6 EXT,0.02 THK,STL	78189	1106-00
	210-0804-00	B010560		1	WASHER,FLAT:0.17 ID X 0.375 INCH OD,STL	12327	ORD BY DESCR
	210-0778-01	B010658		1	EYELET,METALLIC:0.163 OD X 0.15 INCH L,BRS	80009	210-0778-01
	210-0601-01	B010658		1	EYELET,METALLIC:0.183 OD X 0.192 L,BRS	80009	210-0601-01
					************(END ATTACHING PARTS)*********		
-81	214-2836-00	B010174		1	KEY,CONN PLZN:WHITE NYLON	26742	116-1056-00
-82	131-0934-00			1	CONN,RCPT,ELEC:CKT BD,12/24 CONT	31781	307-024-500-302
					**************(ATTACHING PARTS)***********		
-83	211-0014-00			2	SCREW,MACHINE:4-40 X 0.50 INCH,PNH STL	83385	ORD BY DESCR
					************(END ATTACHING PARTS)*********		
-84	407-2015-00			1	BRACKET,CONN:D.C.,ALUMINUM	80009	407-2015-00
					**************(ATTACHING PARTS)***********		
-85	212-0004-00			2	SCREW,MACHINE:8-32 X 0.312 INCH,PNH STL	83385	ORD BY DESCR
-86	211-0008-00			2	SCREW,MACHINE:4-40 X 0.250,PNH,STL,POZ	83385	ORD BY DESCR
					************(END ATTACHING PARTS)*********		
-87	----- -----			1	SWITCH,ATTENUATOR:(SEE A1 REPL)		
					**************(ATTACHING PARTS)***********		
-88	211-0116-00	B010100	B010647	2	SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH BRS	83385	ORD BY DESCR
	211-0292-00	B010648	B011079	2	SCR,ASSEM WSHR:4-40 X 0.29,BRS NI PL	78189	ORD BY DESCR
	211-0661-00	B011080		2	SCREW,MACHINE:4-40 X 0.25 INCH,PNH,STL	78189	ORD BY DESCR
					************(END ATTACHING PARTS)*********		
-89	255-0334-00			IN	PLASTIC CHANNEL:12.75 X 0.175 X 0.155,NYL	11897	122-37-2500
-90	426-1408-00			1	FRAME SECT,CAB.:CENTER	80009	426-1408-00
					**************(ATTACHING PARTS)***********		
-91	211-0507-00			2	SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL	83385	ORD BY DESCR
					************(END ATTACHING PARTS)*********		
-92	214-2540-00	B000100	B010184	1	HT SK,PWR SPLY:	80009	214-2540-00
	214-2540-01	B010185	B010514	1	HEAT SINK,ELEC:POWER SUPPLY,AL	80009	214-2540-01
	214-2540-02	B010515		1	HEAT SINK,ELEC:POWER SUPPLY,AL	80009	214-2540-02
					**************(ATTACHING PARTS)***********		
-93	211-0640-00			4	SCREW,CAP.:6-32 X 0.625,SCH,STL,BD OXD	000AH	ORD BY DESCR
					************(END ATTACHING PARTS)*********		

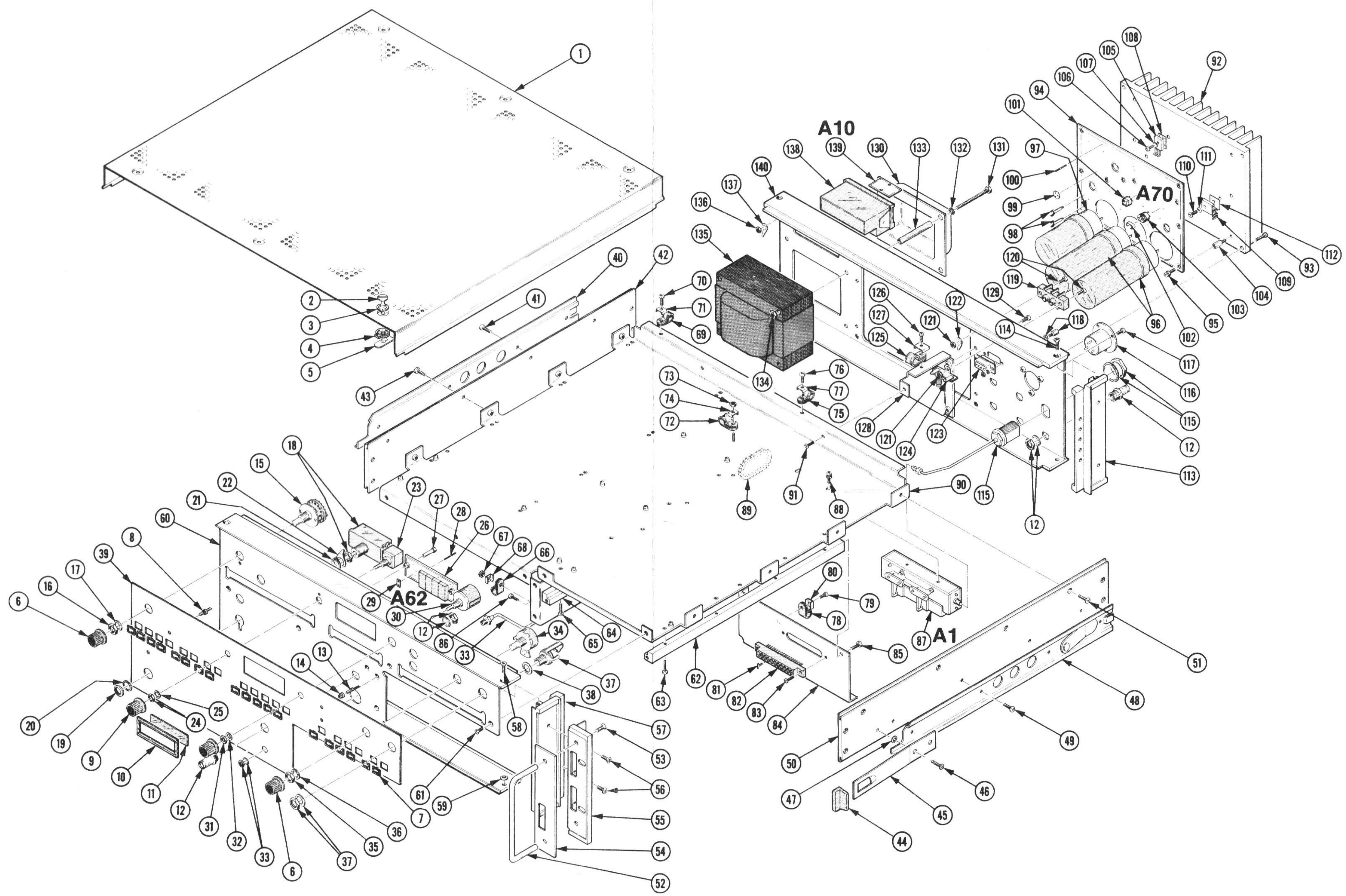
Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
1-94	----- -----			1	CKT BOARD ASSY:POWER SUPPLY(SEE A70 REPL)		
					**************(ATTACHING PARTS)***********		
-95	211-0116-00			8	SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH BRS	83385	ORD BY DESCR
					************(END ATTACHING PARTS)*********		
	----- -----			-	CKT BOARD ASSY INCLUDES:		
-96	----- -----			2	.CAP.,FXD,ELCTLT:(SEE C87,C57 REPL)		
-97	----- -----			1	.CAP.,FXD,ELCTLT:(SEE C37 REPL)		
-98	344-0154-00	B000100	B000119	2	.CLIP,ELECTRICAL:FUSE,CKT BD MT	80009	344-0154-00
	344-0286-00	B010120		2	.CLIP,ELECTRICAL:FOR 3AG FUSE,BRS	75915	102074
-99	214-0817-00			2	.HEAT SINK,XSTR:	14566	A11193-T05
-100	131-0589-00			40	.TERMINAL,PIN:0.46 L X 0.025 SQ	22526	48283-029
-101	136-0220-00	B000100	B010119	9	.SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT,PCB M	71785	133-23-11-034
-102	214-0973-00			1	.HEAT SINK,ELEC:0.28 X 0.18 OVAL X 0.187"H	80009	214-0973-00
-103	136-0235-00			3	.SOCKET,PLUG-IN:6 CONTACT,ROUND	71785	133-96-12-062
-104	129-0236-00	B000100	B010184	8	SPACER,POST:0.188 HEX X 0.375 INCH LONG	06540	9726-A-0440
	129-0762-00	B010185		8	SPACER,POST:0.375 L,W/4-40 INT THD	80009	129-0762-00
-105	----- -----			2	TRANSISTOR:(SEE Q05,Q34 REPL)		
					**************(ATTACHING PARTS)***********		
-106	211-0008-00			2	SCREW,MACHINE:4-40 X 0.250,PNH,STL,POZ	83385	ORD BY DESCR
-107	210-1122-00			2	WASHER,LOCK:0.12 ID,DISHED,0.025 THK	86928	ORD BY DESCR
					************(END ATTACHING PARTS)*********		
-108	342-0163-00			2	INSULR,PLATE:XSTR,0.675 X 0.625 X 0.001"	80009	342-0163-00
-109	----- -----			1	TRANSISTOR:(SEE Q95 REPL)		
					**************(ATTACHING PARTS)***********		
-110	211-0008-00			1	SCREW,MACHINE:4-40 X 0.250,PNH,STL,POZ	83385	ORD BY DESCR
-111	210-1122-00			1	WASHER,LOCK:0.12 ID,DISHED,0.025 THK	86928	ORD BY DESCR
					************(END ATTACHING PARTS)*********		
-112	342-0163-00			1	INSULR,PLATE:XSTR,0.675 X 0.625 X 0.001"	80009	342-0163-00
-113	426-0482-09			2	FRAME SECT,CAB.:UPRIGHT,REAR CORNER	80009	426-0482-09
					**************(ATTACHING PARTS)***********		
-114	212-0043-00			4	SCREW,MACHINE:8-32 X 0.500 INCH,FLH STL	83385	ORD BY DESCR
					************(END ATTACHING PARTS)*********		
-115	175-2078-00			1	CABLE ASSY,RF:50 OHM COAX,6.0 L	80009	175-2078-00
-116	131-2007-00	B000100	B010435	1	CONN,PLUG,ELEC:LATCH LOCKING,3 MALE CONT	80009	131-2007-00
	131-0014-00	B010436		1	CONN,RCPT,ELEC:MALE,3 CONTACT	82389	C3M
					**************(ATTACHING PARTS)***********		
-117	211-0012-00			3	SCREW,MACHINE:4-40 X 0.375,PNH STL CD PL	83385	ORD BY DESCR
					************(END ATTACHING PARTS)*********		
-118	131-0890-00			2	LOCK,CONNECTOR:4-40 X 0.312 L	71468	D 20418-2
-119	124-0342-00			1	TERMINAL BOARD:2 CONTACTS	12089	72202-E
					**************(ATTACHING PARTS)***********		
-120	211-0514-00			2	SCREW,MACHINE:6-32 X 0.750 INCH,PNH STL	83385	ORD BY DESCR
-121	210-0457-00			2	NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL	83385	ORD BY DESCR
-122	210-0202-00			1	TERMINAL,LUG:0.146 ID,LOCKING,BRZ,TIN PL	78189	2104-06-00-2520N
					************(END ATTACHING PARTS)*********		
-123	131-1006-00			1	CONN,RCPT,ELEC:9 CONTACT,FEMALE	71468	DE 9S
-124	131-1023-00			1	CONN,RCPT,ELEC:CENTER,BRASS	80009	131-1023-00
-125	343-0013-00			2	CLAMP,LOOP:0.375 ID,PLASTIC	95987	3-8-6B
					**************(ATTACHING PARTS)***********		
-126	211-0507-00	B000100	B010657	2	SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL	83385	ORD BY DESCR
	211-0511-00	B010658		2	SCREW,MACHINE:6-32 X 0.500,PNH,STL,CD PL	83385	ORD BY DESCR
-127	210-0863-00	B000100	B010657	2	WSHR,LOOP CLAMP:0.187 ID U/W 0.5 W CLP,STL	95987	C191
	210-0005-00	B010658		2	WASHER,LOCK:#6 EXT,0.02 THK,STL	78189	1106-00
	210-0778-01	B010658		2	EYELET,METALLIC:0.163 OD X 0.15 INCH L,BRS	80009	210-0778-01
	210-0601-01	B010658		2	EYELET,METALLIC:0.183 OD X 0.192 L,BRS	80009	210-0601-01
					************(END ATTACHING PARTS)*********		
-128	407-2016-00			2	BRACKET,XFMR:GROUNDING,ALUMINUM	80009	407-2016-00
					**************(ATTACHING PARTS)***********		
-129	211-0507-00			2	SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL	83385	ORD BY DESCR
					************(END ATTACHING PARTS)*********		
-130	200-0772-05			1	COVER,ELEC XFMR:	80009	200-0772-05
					**************(ATTACHING PARTS)***********		
-131	212-0515-00			4	SCREW,MACHINE:10-32 X 2.250" HEX.HD STL	83385	ORD BY DESCR

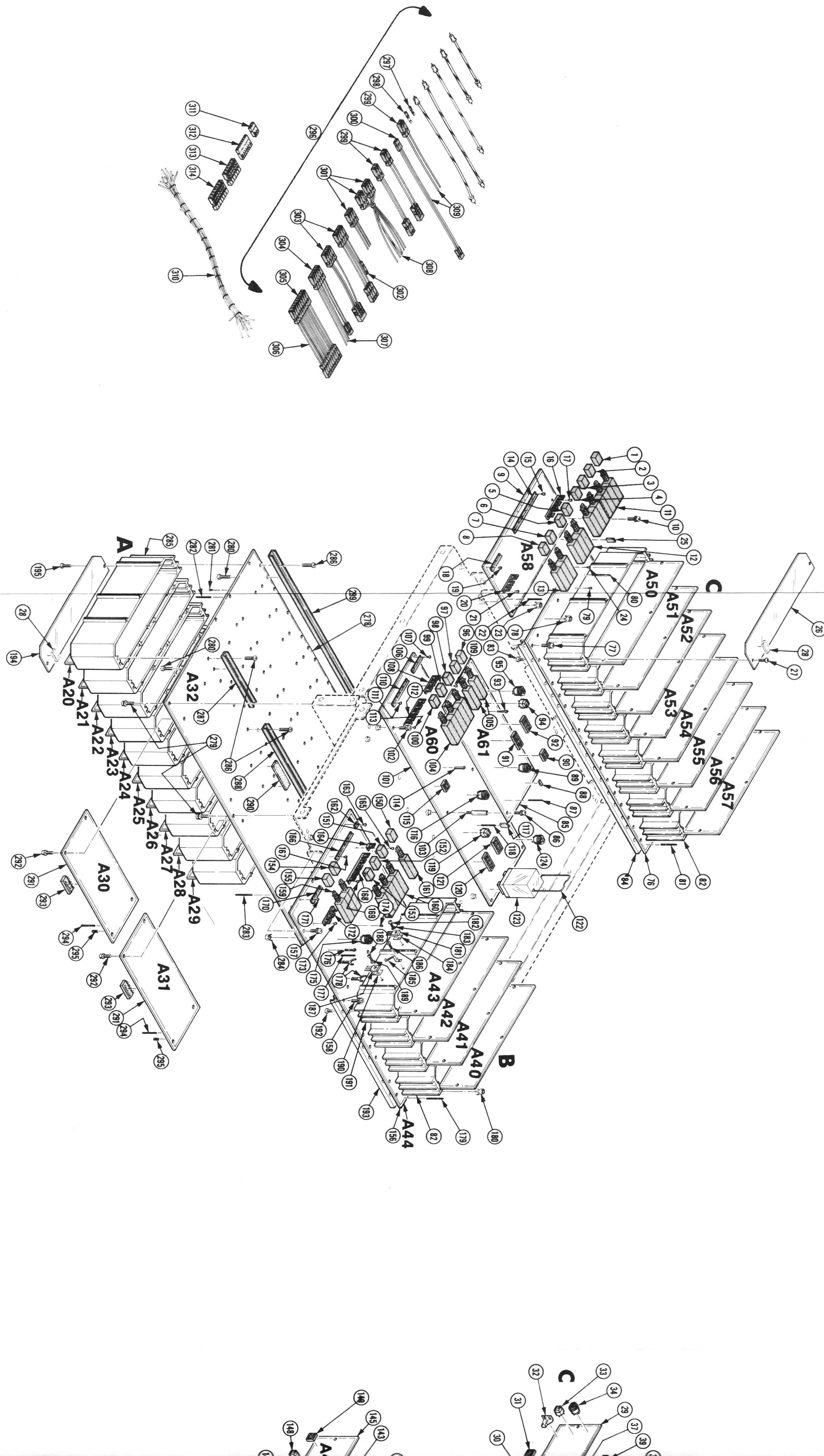
Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
1-132	210-0812-00			4	WASHER,NONMETAL:#10,FIBER	86445	ORD BY DESCR
-133	166-0457-00			4	INSUL SLVG,ELEC:0.19 ID X 1.875"LONG MYLAR	80009	166-0457-00
-134	220-0410-00	B000100	B010175	4	NUT,EXTENDED WA:10-32 X 0.375 INCH,STL	83385	ORD BY DESCR
	220-0410-00	B010176		8	NUT,EXTENDED WA:10-32 X 0.375 INCH,STL	83385	ORD BY DESCR
					************(END ATTACHING PARTS)*********		
-135	----- -----			1	TRANSFORMER:(SEE T10 REPL)		
-136	210-0407-00			2	NUT,PLAIN,HEX.:6-32 X 0.25 INCH,BRS	73743	3038-0228-402
-137	210-0202-00			2	TERMINAL,LUG:0.146 ID,LOCKING,BRZ,TIN PL	78189	2104-06-00-2520N
-138	119-0813-00			1	SELECTOR,VOLTS:W/LINE FLTR RCPT & FUSE	02777	F65003
-139	----- -----			1	.CKT BOARD ASSY:VOLTAGE SELECTION		
	----- -----			-	.(SEE A10 REPL)		
-140	333-2317-00			1	PANEL,REAR:	80009	333-2317-00

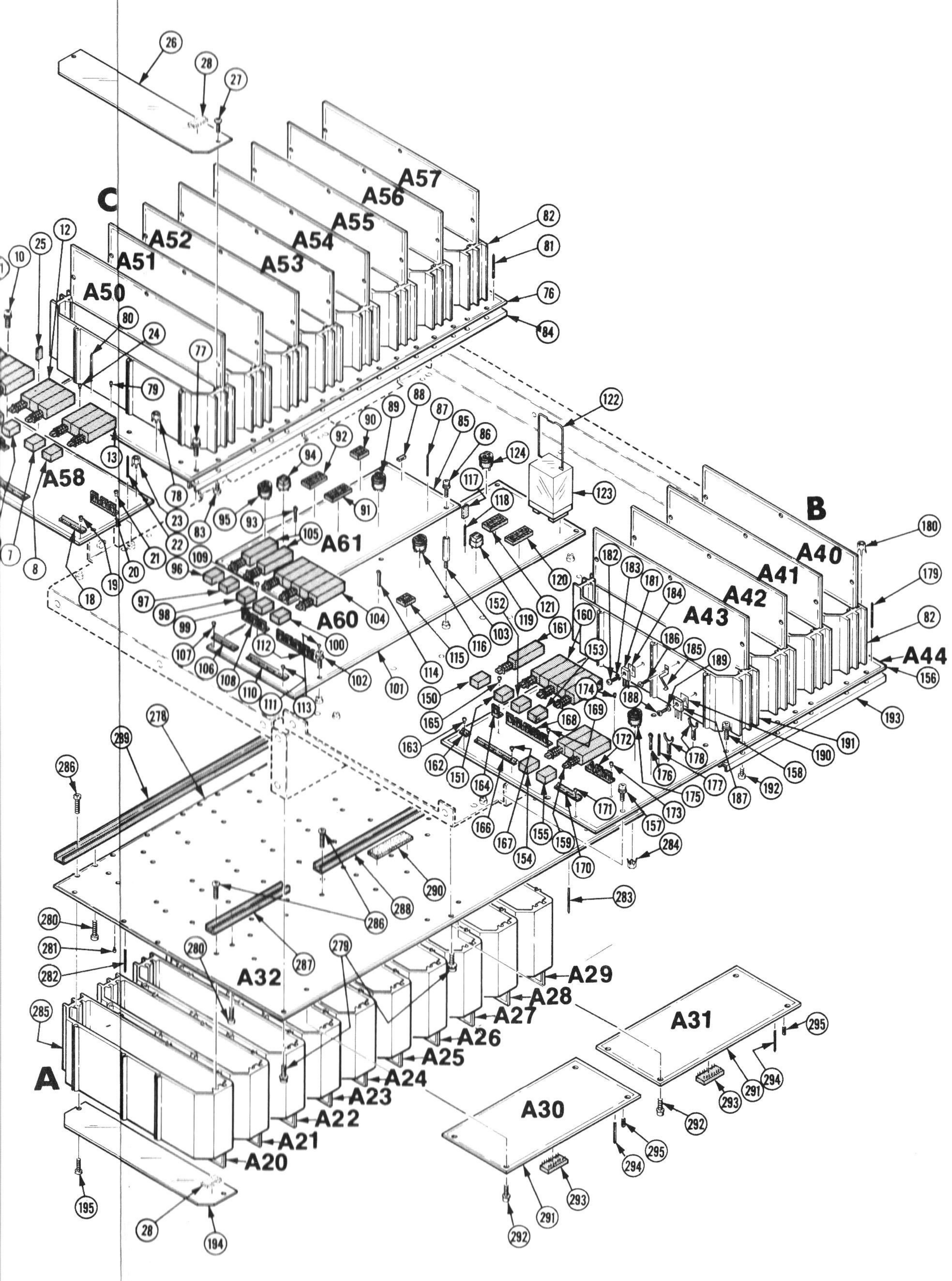


1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
81
82
86
135
136
137
A62

@


A10
A70
A62
A1


A
A20
A21
A22
A23
A24
A25
A26
A27
A28
A29
A30
A31
A32
B
A40
A41
A42
A43
A44
C
A50
A51
A52
A53
A54
A55
A56
A57
A58
A60
A61


A
B
C
A20
A21
A22
A23
A24
A25
A26
A27
A28
A29
A30
A31
A32
A40
A41
A42
A43
A44
A50
A51
A52
A53
A54
A55
A56
A57
A58
A60
A61

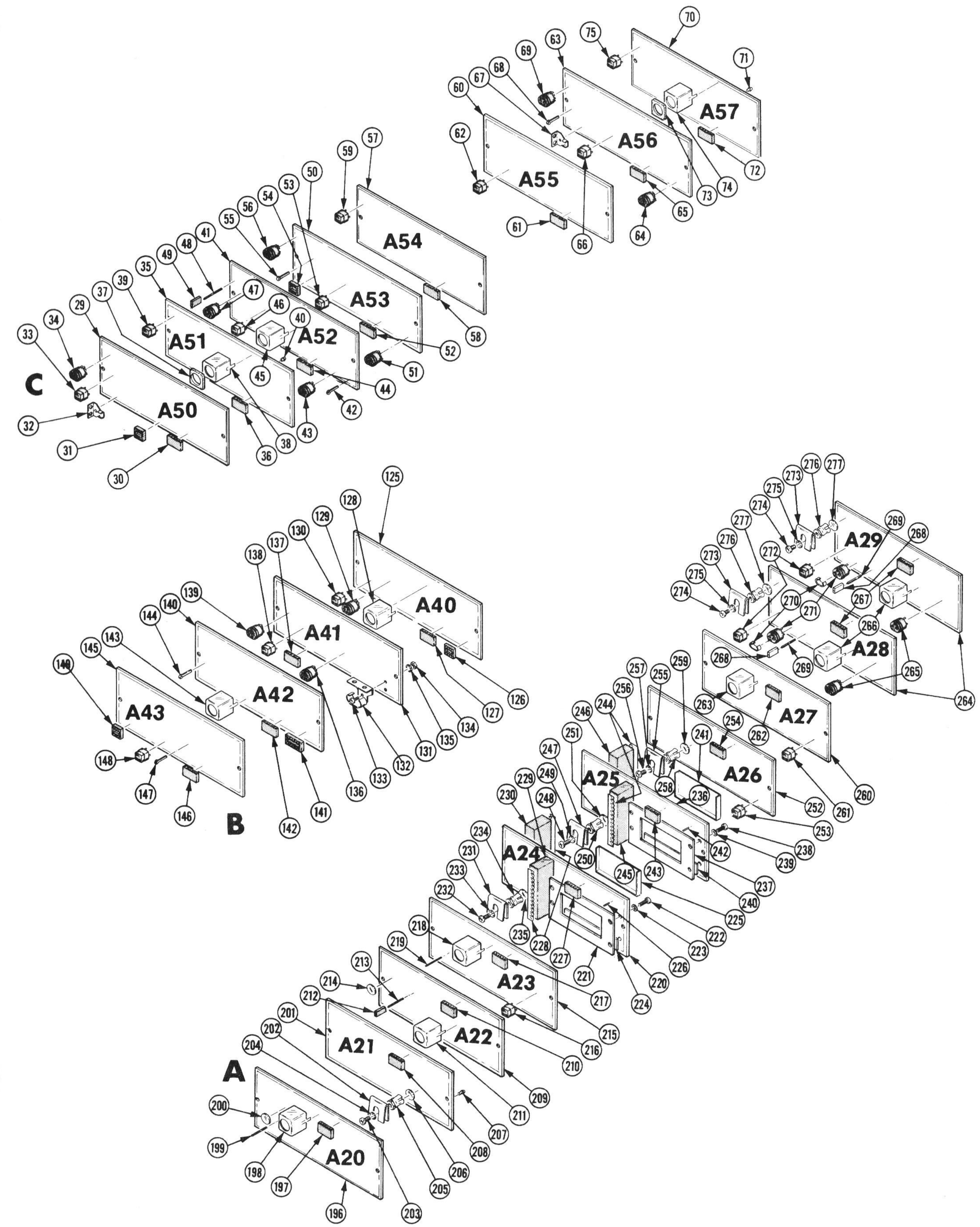

A
B
C
A20
A21
A22
A23
A24
A25
A26
A27
A28
A29
A40
A41
A42
A43
A50
A51
A52
A53
A54
A55
A56
A57

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
2-1	366-1557-71			1	PUSH BUTTON:BLACK,ENV	80009	366-1557-71
-2	366-1557-72			1	PUSH BUTTON:BLACK,BACK PORCH	80009	366-1557-72
-3	366-1557-01			1	PUSH BUTTON:SYNC TIP	80009	366-1557-01
-4	366-1557-75			1	PUSH BUTTON:BLACK,CONT	80009	366-1557-75
-5	366-1557-69			1	PUSH BUTTON:BLACK,OUT	80009	366-1557-69
-6	366-1557-70			1	PUSH BUTTON:BLACK,IN	80009	366-1557-70
-7	366-1402-98			1	PUSH BUTTON:OFF	80009	366-1402-98
-8	366-1489-95			1	PUSH BUTTON:ON	80009	366-1489-95
-9	----- -----			1	CKT BOARD ASSY:PHASE LOCK SW		
	----- -----			-	(SEE A58 REPL)		
					**************(ATTACHING PARTS)***********		
-10	211-0116-00			4	SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH BRS	83385	ORD BY DESCR
					************(END ATTACHING PARTS)*********		
	----- -----			-	CKT BOARD ASSY INCLUDES:		
-11	----- -----			1	.SWITCH PB ASSY:(SEE S22 REPL)		
-12	----- -----			1	.SWITCH PB ASSY:(SEE S25 REPL)		
-13	----- -----			1	.SWITCH PB ASSY:(SEE S28 REPL)		
-14	343-0495-07			1	.CLIP,SWITCH:FRONT,7.5MM,7 UNIT	80009	343-0495-07
					.*************(ATTACHING PARTS)***********		
-15	210-3033-00			5	.EYELET,METALLIC:0.59 OD X 0.156 INCH LONG	07707	SE-25
					.***********(END ATTACHING PARTS)*********		
-16	343-0499-04	B000100	B010774	1	.CLIP,SWITCH:REAR,7.5MM X 4 UNIT	80009	343-0499-04
	343-0499-13	B010775		1	.CLIP,SWITCH:7.5MM X 4 UNIT	80009	343-0499-13
					.*************(ATTACHING PARTS)***********		
-17	210-3033-00			3	.EYELET,METALLIC:0.59 OD X 0.156 INCH LONG	07707	SE-25
					.***********(END ATTACHING PARTS)*********		
-18	343-0495-03			2	.CLIP,SWITCH:FRONT,7.5 MM,3 UNIT	80009	343-0495-03
					.*************(ATTACHING PARTS)***********		
-19	210-3033-00			4	.EYELET,METALLIC:0.59 OD X 0.156 INCH LONG	07707	SE-25
					.***********(END ATTACHING PARTS)*********		
-20	343-0499-03			3	.CLIP,SWITCH:7.5 MM,4 UNIT	80009	343-0499-03
					.*************(ATTACHING PARTS)***********		
-21	210-3033-00			6	.EYELET,METALLIC:0.59 OD X 0.156 INCH LONG	07707	SE-25
					.***********(END ATTACHING PARTS)*********		
-22	131-0589-00	B000100	B000119	27	.TERMINAL,PIN:0.46 L X 0.025 SQ	22526	48283-029
	131-0589-00	B010120		28	.TERMINAL,PIN:0.46 L X 0.025 SQ	22526	48283-029
-23	131-1003-00			3	.CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
-24	136-0252-07			3	.SOCKET,PIN CONN:W/O DIMPLE	22526	75060-012
-25	131-0993-00			1	.BUS,CONDUCTOR:2 WIRE BLACK	00779	850100-01
-26	200-2077-00			12	COVER,CKT BD:ALUMINUM	80009	200-2077-00
					**************(ATTACHING PARTS)***********		
-27	213-0774-00	B000100	B010649	24	SCREW,TPG,TF:M3-0.5 X 10 MM L,PNH,TAPTIT	93907	ORD BY DESCR
	211-0294-00	B010650		24	SCREW,MACHINE:M3 X 0.5 X 10MM,PNH	93907	ORD BY DESCR
					************(END ATTACHING PARTS)*********		
-28	348-0594-00	B010120		24	PAD,CUSHIONING:0.8 X 0.4,SILICON RUBBER	80009	348-0594-00
-29	----- -----			1	CKT BOARD ASSY:REF CONTROL(SEE A50 REPL)		
-30	131-1771-00			2	.CONNECTOR,RCPT,:CIRCUIT CARD,6 FEMALE	22526	65001-111
-31	136-0514-00			1	.SKT,PL-IN ELEC:MICROCIRCUIT,8 DIP	09922	DILB8P-108
-32	136-0208-00			1	.SOCKET,PLUG-IN:CRYSTAL AUGAT	91506	8004-1G5
-33	136-0220-00	B000100	B000119	7	.SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT,PCB M	71785	133-23-11-034
-34	136-0241-00	B000100	B010782	1	.SKT,PL-IN ELEK:MICROCIRCUIT,10 CONT,PCB M	71785	133-99-12-064
-35	----- -----			1	CKT BOARD ASSY:REF OSCILLATOR		
	----- -----			-	(SEE A51 REPL)		
-36	131-1771-00			2	.CONNECTOR,RCPT,:CIRCUIT CARD,6 FEMALE	22526	65001-111
-37	348-0562-00			2	.PAD,CUSHIONING:0.5 SQ,SILICONE RUBBER	80009	348-0562-00
	----- -----			-	.(1450 ONLY)		
	348-0562-00	B010380	B011084	2	.PAD,CUSHIONING:0.5 SQ,SILICONE RUBBER	80009	348-0562-00
	----- -----			-	.(1450-1 ONLY)		
-38	337-1417-00			2	.SHIELD,ELEC:0.55 SQ X 0.685 INCH HIGH	80009	337-1417-00
-39	136-0220-00	B000100	B00119X	6	.SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT,PCB M	71785	133-23-11-034
-40	386-1635-00	B010120		1	.SUPPORT,CKT BD:CHASSIS MT,ACETAL	80009	386-1635-00

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
2-41	----- -----			1	CKT BOARD ASSY:PHASE SHIFTER		
	----- -----			-	(SEE A52 REPL)		
-42	214-0579-00			1	.TERM,TEST POINT:BRS CD PL	80009	214-0579-00
-43	136-0241-00	B000100	B010782	2	.SKT,PL-IN ELEK:MICROCIRCUIT,10 CONT,PCB M	71785	133-99-12-064
-44	131-1771-00			2	.CONNECTOR,RCPT,:CIRCUIT CARD,6 FEMALE	22526	65001-111
-45	337-1417-00			1	.SHIELD,ELEC:0.55 SQ X 0.685 INCH HIGH	80009	337-1417-00
-46	136-0220-00	B000100	B000119	7	.SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT,PCB M	71785	133-23-11-034
-47	136-0237-00			1	.SOCKET,PLUG-IN:8 CONTACT,ROUND	71785	133-98-12-062
-48	131-0589-00			2	.TERMINAL,PIN:0.46 L X 0.025 SQ	22526	48283-029
-49	131-0993-00			1	.BUS,CONDUCTOR:2 WIRE BLACK	00779	850100-01
2-50	----- -----			1	CKT BOARD ASSY:CONV PHASE LOCK		
	----- -----			-	(SEE A53 REPL)		
-51	136-0241-00	B000100	B010782	2	.SKT,PL-IN ELEK:MICROCIRCUIT,10 CONT,PCB M	71785	133-99-12-064
-52	131-1771-00			2	.CONNECTOR,RCPT,:CIRCUIT CARD,6 FEMALE	22526	65001-111
-53	136-0220-00	B000100	B000119	11	.SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT,PCB M	71785	133-23-11-034
-54	136-0514-00			1	.SKT,PL-IN ELEC:MICROCIRCUIT,8 DIP	09922	DILB8P-108
-55	214-0579-00			4	.TERM,TEST POINT:BRS CD PL	80009	214-0579-00
-56	136-0237-00			2	.SOCKET,PLUG-IN:8 CONTACT,ROUND	71785	133-98-12-062
-57	----- -----			1	CKT BOARD ASSY:DET/PHASE CONT		
	----- -----			-	(SEE A54 REPL)		
-58	131-1771-00			2	.CONNECTOR,RCPT,:CIRCUIT CARD,6 FEMALE	22526	65001-111
-59	136-0220-00	B000100	B000119	8	.SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT,PCB M	71785	133-23-11-034
-60	----- -----			1	CKT BOARD ASSY:LIMITER(SEE A55 REPL)		
-61	131-1771-00			2	.CONNECTOR,RCPT,:CIRCUIT CARD,6 FEMALE	22526	65001-111
-62	136-0220-00	B000100	B000119	17	.SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT,PCB M	71785	133-23-11-034
-63	----- -----			1	CKT BOARD ASSY:CONV CONTROL(SEE A56 REPL)		
	386-1635-00	B010120		1	.SUPPORT,CKT BD:CHASSIS MT,ACETAL	80009	386-1635-00
-64	136-0241-00	B000100	B010782	1	.SKT,PL-IN ELEK:MICROCIRCUIT,10 CONT,PCB M	71785	133-99-12-064
-65	131-1771-00			2	.CONNECTOR,RCPT,:CIRCUIT CARD,6 FEMALE	22526	65001-111
-66	136-0220-00	B000100	B000119	7	.SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT,PCB M	71785	133-23-11-034
-67	136-0208-00			1	.SOCKET,PLUG-IN:CRYSTAL AUGAT	91506	8004-1G5
-68	214-0579-00			1	.TERM,TEST POINT:BRS CD PL	80009	214-0579-00
-69	136-0235-00			1	.SOCKET,PLUG-IN:6 CONTACT,ROUND	71785	133-96-12-062
-70	----- ----			1	CKT BOARD ASSY:CONVERTER OSC		
	----- -----			-	(SEE A57 REPL)		
-71	386-1635-00	B010120		1	.SUPPORT,CKT BD:CHASSIS MT,ACETAL	80009	386-1635-00
-72	131-1771-00			2	.CONNECTOR,RCPT,:CIRCUIT CARD,6 FEMALE	22526	65001-111
-73	348-0562-00			2	.PAD,CUSHIONING:0.5 SQ,SILICONE RUBBER	80009	348-0562-00
	----- -----			-	.(1450 ONLY)		
	348-0562-00	B010380	B011084	2	.PAD,CUSHIONING:0.5 SQ,SILICONE RUBBER	80009	348-0562-00
	----- -----			-	.(1450-1 ONLY)		
-74	337-1417-00			2	.SHIELD,ELEC:0.55 SQ X 0.685 INCH HIGH	80009	337-1417-00
-75	136-0220-00	B000100	B000119	4	.SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT,PCB M	71785	133-23-11-034
-76	----- -----			1	CKT BOARD ASSY:PH LOCK INTFC		
	----- -----			-	(SEE A59 REPL)		
					**************(ATTACHING PARTS)***********		
-77	211-0121-00			8	SCR,ASSEM WSHR:4-40 X 0.438 INCH,PNH BRS	83385	ORD BY DESCR
					************(END ATTACHING PARTS)*********		
	----- -----			-	CKT BOARD ASSY INCLUDES:		
-78	131-1003-00			7	.CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
-79	136-0252-07			7	.SOCKET,PIN CONN:W/O DIMPLE	22526	75060-012
-80	131-0589-00			13	.TERMINAL,PIN:0.46 L X 0.025 SQ	22526	48283-029
-81	131-0787-00			96	.CONTACT,ELEC:0.64 INCH LONG	22526	47359
-82	380-0503-00	B000100	B010649	11	HOUSING,CKT BD:5.775 L X 1.92 W,AL	80009	380-0503-00
	380-0503-02	B010650		11	HOUSING,CKT BD:5.775 L X 1.92 W,AL	80009	380-0503-02
					**************(ATTACHING PARTS)***********		
-83	213-0774-00	B000100	B010649	88	SCREW,TPG,TF:M3-0.5 X 10 MM L,PNH,TAPTIT	93907	ORD BY DESCR
	211-0294-00	B010650		88	SCREW,MACHINE:M3 X 0.5 X 10MM,PNH	93907	ORD BY DESCR
					************(END ATTACHING PARTS)*********		
-84	386-3726-00			2	STIF,CKT CD:7.35 L,AL	80009	386-3726-00

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
2-85	----- -----			1	CKT BOARD ASSY:AGC RDOUT DRIVER		
	----- -----			-	(SEE A61 REPL)		
					**************(ATTACHING PARTS)***********		
-86	211-0116-00			2	SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH BRS	83385	ORD BY DESCR
					***********(END ATTACHING PARTS)*********		
	----- -----			-	CKT BOARD ASSY INCLUDES:		
-87	131-0589-00			18	.TERMINAL,PIN:0.46 L X 0.025 SQ	22526	48283-029
-88	136-0328-03			27	.SOCKET,PIN TERM:HORIZ,SQ PIN RCPT	22526	47710
-89	136-0237-00			1	.SOCKET,PLUG-IN:8 CONTACT,ROUND	71785	133-98-12-062
-90	136-0514-00			1	.SKT,PL-IN ELEC:MICROCIRCUIT,8 DIP	09922	DILB8P-108
-91	136-0260-02	B010100	B011349	9	.SKT,PL-IN ELEK:MICROCIRCUIT,16 DIP,LOW CL	09922	DILB16P-108T
	136-0260-02	B010350	B010644	6	.SKT,PL-IN ELEK:MICROCIRCUIT,16 DIP,LOW CL	09922	DILB16P-108T
-92	136-0269-02			6	.SKT,PL-IN ELEK:MICROCIRCUIT,14 DIP,LOW CL	09922	DILB149P-108
-93	214-0579-00			1	.TERM,TEST POINT:BRS CD PL	80009	214-0579-00
-94	136-0220-00	B000100	B000119	5	.SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT,PCB M	71785	133-23-11-034
-95	136-0235-00			1	.SOCKET,PLUG-IN:6 CONTACT,ROUND	71785	133-96-12-062
-96	366-1557-77			1	PUSH BUTTON:BLACK,10 DB	80009	366-1557-77
-97	366-1557-73			1	PUSH BUTTON:BLACK,20 DB	80009	366-1557-73
-98	366-1557-72			1	PUSH BUTTON:BLACK,BACK PORCH	80009	366-1557-72
-99	366-1557-01			1	PUSH BUTTON:SYNC TIP	80009	366-1557-01
-100	366-1557-68			1	PUSH BUTTON:BLACK,MAN	80009	366-1557-68
-101	----- -----			1	CKT BOARD ASSY:A.G.C. LOGIC(SEE A60 REPL)		
					**************(ATTACHING PARTS)***********		
-102	211-0116-00			4	SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH BRS	83385	ORD BY DESCR
-103	129-0456-00			2	SPACER,POST:0.75 L,W/4-40 STUD,TAP,BRAS	80009	129-0456-00
					***********(END ATTACHING PARTS)*********		
	----- -----			-	CKT BOARD ASSY INCLUDES:		
-104	----- -----			1	.SWITCH PB ASSY:(SEE S06 REPL)		
-105	----- -----			2	.SWITCH PB ASSY:(SEE S01,S03 REPL)		
-106	343-0495-03			1	.CLIP,SWITCH:FRONT,7.5 MM,3 UNIT	80009	343-0495-03
					.*************(ATTACHING PARTS)***********		
-107	210-3033-00			2	.EYELET,METALLIC:0.59 OD X 0.156 INCH LONG	07707	SE-25
					.***********(END ATTACHING PARTS)*********		
-108	343-0499-03			1	.CLIP,SWITCH:7.5 MM,4 UNIT	80009	343-0499-03
					.*************(ATTACHING PARTS)***********		
-109	210-3033-00			2	.EYELET,METALLIC:0.59 OD X 0.156 INCH LONG	07707	SE-25
					.***********(END ATTACHING PARTS)*********		
-110	343-0495-05			1	.CLIP,SWITCH:FRONT,7.5MM X 5 UNIT	80009	343-0495-05
					.*************(ATTACHING PARTS)***********		
-111	210-3033-00			3	.EYELET,METALLIC:0.59 OD X 0.156 INCH LONG	07707	SE-25
					.***********(END ATTACHING PARTS)*********		
-112	343-0499-05	B000100	B010749	1	.CLIP,SWITCH:REAR,7.5MM X 5 UNIT	80009	343-0499-05
	343-0499-14	B010750		1	.CLIP,SWITCH:7.5MM X 5 UNIT	80009	343-0499-14
					.*************(ATTACHING PARTS)***********		
-113	210-3033-00			3	.EYELET,METALLIC:0.59 OD X 0.156 INCH LONG	07707	SE-25
					.***********(END ATTACHING PARTS)*********		
-114	214-0579-00			4	.TERM,TEST POINT:BRS CD PL	80009	214-0579-00
-115	136-0514-00	B000100	B000119	3	.SKT,PL-IN ELEC:MICROCIRCUIT,8 DIP	09922	DILB8P-108
-116	136-0237-00			1	.SOCKET,PLUG-IN:8 CONTACT,ROUND	71785	133-98-12-062
-117	131-0993-00			1	.BUS,CONDUCTOR:2 WIRE BLACK	00779	850100-01
-118	131-0589-00	B000100	B010213	98	.TERMINAL,PIN:0.46 L X 0.025 SQ	22526	48283-029
	131-0589-00	B010214		97	.TERMINAL,PIN:0.46 L X 0.025 SQ	22526	48283-029
-119	136-0220-00	B000100	B000119	11	.SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT,PCB M	71785	133-23-11-034
-120	136-0260-02	B000100	B000119	3	.SKT,PL-IN ELEK:MICROCIRCUIT,16 DIP,LOW CL	09922	DILB16P-108T
	136-0260-02	B010120	B010271	1	.SKT,PL-IN ELEK:MICROCIRCUIT,16 DIP,LOW CL	09922	DILB16P-108T
	136-0260-02	B010272	B010544	2	.SKT,PL-IN ELEK:MICROCIRCUIT,16 DIP,LOW CL	09922	DILB16P-108T
	136-0729-00	B010645		2	.SKT,PL-IN ELEK:MICROCKT,16 CONTACT	09922	DILB16P-108T
-121	136-0269-02	B000100	B000119	18	.SKT,PL-IN ELEK:MICROCIRCUIT,14 DIP,LOW CL	09922	DILB149P-108
-122	136-0394-00			1	.SOCKET,PLUG-IN:10 PIN,CKT CD MTG	12300	27E709 W/20C249
-123	----- -----			1	.RELAY ARMATURE:(SEE K97 REPL)		
-124	136-0241-00			1	.SKT,PL-IN ELEK:MICROCIRCUIT,10 CONT,PCB M	71785	133-99-12-064

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
2-125	----- -----			1	CKT BOARD ASSY:1ST AUD MIXER		
	----- -----			-	(SEE A40 REPL)		
-126	136-0514-00	B000100	B010644	1	.SKT,PL-IN ELEC:MICROCIRCUIT,8 DIP	09922	DILB8P-108
-127	131-1771-00			2	.CONNECTOR,RCPT,:CIRCUIT CARD,6 FEMALE	22526	65001-111
-128	337-1417-00			3	.SHIELD,ELEC:0.55 SQ X 0.685 INCH HIGH	80009	337-1417-00
-129	136-0241-00	B000100	B010782	1	.SKT,PL-IN ELEK:MICROCIRCUIT,10 CONT,PCB M	71785	133-99-12-064
-130	136-0220-00	B000100	B000119	3	.SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT,PCB M	71785	133-23-11-034
-131	----- -----			1	CKT BOARD ASSY:2ND AUD MIXER		
	----- -----			-	(SEE A41 REPL)		
-132	136-0153-00			1	.SKT,PL-IN,ELEK:CRYSTAL,2 CONT,W/CLAMP	91506	8000AG6
					.************(ATTACHING PARTS)***********		
-133	211-0022-00			2	.SCREW,MACHINE:2-56 X 0.188,PNH,STL,CD PL	83385	ORD BY DESCR
-134	210-0405:00			2	.NUT,PLAIN,HEX.:2-56 X 0.188 INCH,BRS	73743	12157-50
-135	210-0001-00			2	.WASHER,LOCK:#2 INTL,0.013 X 0.18 OD,STL	78189	1202-00-00-0541C
					.**********(END ATTACHING PARTS)*********		
-136	136-0241-00	B000100	B010782	1	.SKT,PL-IN ELEK:MICROCIRCUIT,10 CONT,PCB M	71785	133-99-12-064
-137	131-1771-00			2	.CONNECTOR,RCPT,:CIRCUIT CARD,6 FEMALE	22526	65001-111
-138	136-0220-00	B000100	B000119	3	.SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT,PCB M	71785	133-23-11-034
-139	136-0237-00			1	.SOCKET,PLUG-IN:8 CONTACT,ROUND	71785	133-98-12-062
-140	----- -----			1	CKT BOARD ASSY:AUD LIMITER(SEE A42 REPL)		
-141	136-0269-02			1	.SKT,PL-IN ELEK:MICROCIRCUIT,14 DIP,LOW CL	09922	DILB149P-108
-142	131-1771-00			2	.CONNECTOR,RCPT,:CIRCUIT CARD,6 FEMALE	22526	65001-111
-143	337-1417-00			4	.SHIELD,ELEC:0.55 SQ X 0.685 INCH HIGH	80009	337-1417-00
-144	214-0579-00			1	.TERM,TEST POINT:BRS CD PL	80009	214-0579-00
-145	----- -----			1	CKT BOARD ASSY:AUD DSCRM(SEE A43 REPL)		
-146	131-1771-00			2	.CONNECTOR,RCPT,:CIRCUIT CARD,6 FEMALE	22526	65001-111
-147	214-0579-00			1	.TERM,TEST POINT:BRS CD PL	80009	214-0579-00
-148	136-0220-00	B000100	B000119	8	.SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT,PCB M	71785	133-23-11-034
-149	136-0514-00			1	.SKT,PL-IN ELEC:MICROCIRCUIT,8 DIP	09922	DILB8P-108
-150	366-1480-00			1	PUSH BUTTON:BLK,0.328 X 0.253 X 0.43	80009	366-1480-00
-151	366-1557-76			1	PUSH BUTTON:BLACK,SPLIT	80009	366-1557-76
-152	366-1557-74			1	PUSH BUTTON:BLACK,INTR	80009	366-1557-74
-153	366-1489-43			1	PUSH BUTTON:EXT	80009	366-1489-43
-154	366-1557-69			1	PUSH BUTTON:BLACK,OUT	80009	366-1557-69
-155	366-1557-70			1	PUSH BUTTON:BLACK,IN	80009	366-1557-70
-156	----- -----			1	CKT BOARD ASSY:AUDIO INTFC(SEE A44 REPL)		
					**************(ATTACHING PARTS)***********		
-157	211-0116-00			2	SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH BRS	83385	ORD BY DESCR
-158	211-0121-00			6	SCR,ASSEM WSHR:4-40 X 0.438 INCH,PNH BRS	83385	ORD BY DESCR
					************(END ATTACHING PARTS)*********		
	----- -----			-	CKT BOARD ASSY INCLUDES:		
-159	----- -----			1	.SWITCH PB ASSY:(SEE S07 REPL)		
-160	----- -----			1	.SWITCH PB ASSY:(SEE S04 REPL)		
-161	----- -----			1	.SWITCH PB ASSY:(SEE S01 REPL)		
-162	343-0495-01	B010120	B010169	1	.CLIP,SWITCH:FRONT,7.5 MM,1 UNIT	80009	343-0495-01
					.************(ATTACHING PARTS)***********		
-163	210-3033-00	B010120	B010169	2	.EYELET,METALLIC:0.59 OD X 0.156 INCH LONG	07707	SE-25
					.**********(END ATTACHING PARTS)*********		
-164	343-0499-01	B010120	B010169	1	.CLIP,SWITCH:REAR,7.5 MM,1 UNIT	80009	343-0499-01
					.************(ATTACHING PARTS)***********		
-165	210-3033-00	B010120	B010169	2	.EYELET,METALLIC:0.59 OD X 0.156 INCH LONG	07707	SE-25
					.**********(END ATTACHING PARTS)*********		
-166	343-0495-05			1	.CLIP,SWITCH:FRONT,7.5MM X 5 UNIT	80009	343-0495-05
					.************(ATTACHING PARTS)***********		
-167	210-3033-00			3	.EYELET,METALLIC:0.59 OD X 0.156 INCH LONG	07707	SE-25
					.**********(END ATTACHING PARTS)*********		
-168	343-0499-05	B000100	B010749	1	.CLIP,SWITCH:REAR,7.5MM X 5 UNIT	80009	343-0499-05
	343-0499-14	B010750		1	.CLIP,SWITCH:7.5MM X 5 UNIT	80009	343-0499-14
					.************(ATTACHING PARTS)***********		
-169	210-3033-00			3	.EYELET,METALLIC:0.59 OD X 0.156 INCH LONG	07707	SE-25
					.**********(END ATTACHING PARTS)*********		

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
2-170	343-0495-03	B010120	B010169	1	.CLIP,SWITCH:FRONT,7.5 MM,3 UNIT	80009	343-0495-03
	343-0495-03	B010170		2	.CLIP,SWITCH:FRONT,7.5 MM,3 UNIT	80009	343-0495-03
					.************(ATTACHING PARTS)***********		
-171	210-3033-00			4	.EYELET,METALLIC:0.59 OD X 0.156 INCH LONG	07707	SE-25
					.**********(END ATTACHING PARTS)*********		
-172	343-0499-03			2	.CLIP,SWITCH:7.5 MM,4 UNIT	80009	343-0499-03
					.************(ATTACHING PARTS)***********		
-173	210-3033-00			4	.EYELET,METALLIC:0.59 OD X 0.156 INCH LONG	07707	SE-25
					.**********(END ATTACHING PARTS)*********		
-174	136-0252-07			4	.SOCKET,PIN CONN:W/O DIMPLE	22526	75060-012
-175	136-0235-00			2	.SOCKET,PLUG-IN:6 CONTACT,ROUND	71785	133-96-12-062
-176	214-0579-00			2	.TERM,TEST POINT:BRS CD PL	80009	214-0579-00
-177	131-0589-00			25	.TERMINAL,PIN:0.46 L X 0.025 SQ	22526	48283-029
-178	344-0154-00	B000100	B000119	4	.CLIP,ELECTRICAL:FUSE,CKT BD MT	80009	344-0154-00
	344-0286-00	B010120		4	.CLIP,ELECTRICAL:FOR 3AG FUSE,BRS	75915	102074
-179	131-0787-00			48	.CONTACT,ELEC:0.64 INCH LONG	22526	47359
-180	131-1003-00			4	.CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
-181	----- -----			2	TRANSISTOR:(SEE Q52,Q55 REPL)		
					**************(ATTACHING PARTS)***********		
-182	211-0008-00			2	SCREW,MACHINE:4-40 X 0.250,PNH,STL,POZ	83385	ORD BY DESCR
-183	210-1122-00			2	WASHER,LOCK:0.12 ID,DISHED,0.025 THK	86928	ORD BY DESCR
					***********(END ATTACHING PARTS)*********		
-184	342-0224-00	B000100	B010187	6	INSULATOR,PLATE:TRANSISTOR	80009	342-0224-00
	342-0224-00	B010188		4	INSULATOR,PLATE:TRANSISTOR	80009	342-0224-00
-185	343-0783-00	B010188		2	CLAMP,XSTR:COPPER BERYLLIUM	80009	343-0783-00
					**************(ATTACHING PARTS)***********		
-186	211-0008-00	B000100	B010187	2	SCREW,MACHINE:4-40 X 0.250,PNH,STL,POZ	83385	ORD BY DESCR
	211-0007-00	B010188	B010559	2	SCREW,MACHINE:4-40 X 0.188,PNH STL,CD PL	83385	ORD BY DESCR
	211-0005-00	B010560		2	SCREW,MACHINE:4-40 X 0.125 INCH,PNH STL	83385	ORD BY DESCR
					***********(END ATTACHING PARTS)*********		
-187	----- -----			2	TRANSISTOR:(SEE Q54,Q57 REPL)		
					**************(ATTACHING PARTS)***********		
-188	211-0008-00			2	SCREW,MACHINE:4-40 X 0.250,PNH,STL,POZ	83385	ORD BY DESCR
-189	210-1122-00			2	WASHER,LOCK:0.12 ID,DISHED,0.025 THK	86928	ORD BY DESCR
					***********(END ATTACHING PARTS)*********		
-190	342-0224-00	B000100	B010187	6	INSULATOR,PLATE:TRANSISTOR	80009	342-0224-00
	342-0224-00	B010188		4	INSULATOR,PLATE:TRANSISTOR	80009	342-0224-00
-191	380-0503-01	B000100	B010649	1	HOUSING,CKT BD:W/HOLES,ALUMINUM	80009	380-0503-01
	380-0503-03	B010650		1	HOUSING,CKT BD:W/HOLES,ALUMINUM	80009	380-0503-03
					**************(ATTACHING PARTS)***********		
-192	213-0774-00	B000100	B010649	8	SCREW,TPG,TF:M3-0.5 X 10 MM L,PNH,TAPTIT	93907	ORD BY DESCR
	211-0294-00	B010650		8	SCREW,MACHINE:M3 X 0.5 X 10MM,PNH	93907	ORD BY DESCR
					***********(END ATTACHING PARTS)*********		
-193	386-3724-00			2	STIF,CKT CD:5.6 L,AL	80009	386-3724-00
-194	200-2077-00			10	COVER,CKT BD:ALUMINUM	80009	200-2077-00
					**************(ATTACHING PARTS)***********		
-195	213-0774-00	B000100	B010649	20	SCREW,TPG,TF:M3-0.5 X 10 MM L,PNH,TAPTIT	93907	ORD BY DESCR
	213-0294-00	B010650		20	SCREW,ADJUSTING:10-32 X 2.75,SST	80009	213-0294-00
					***********(END ATTACHING PARTS)*********		
-196	----- -----			1	CKT BOARD ASSY:I.F. FLTR/AMP		
	----- -----			-	(SEE A20 REPL)		
-197	131-1771-00			2	.CONNECTOR,RCPT,:CIRCUIT CARD,6 FEMALE	22526	65001-111
-198	337-1417-00			4	.SHIELD,ELEC:0.55 SQ X 0.685 INCH HIGH	80009	337-1417-00
-199	131-0589-00			8	.TERMINAL,PIN:0.46 L X 0.025 SQ	22526	48283-029
-200	214-0817-00	B010347		2	.HEAT SINK,XSTR:	14566	A11193-T05
-201	----- -----			1	CKT BOARD ASSY:I.F. ATTEN/AMPL		
	----- -----			-	(SEE A21 REPL)		
-202	214-2746-00			1	.HEAT SINK,XSTR:(1)TO-39,ALUMINUM	80009	214-2746-00
					.************(ATTACHING PARTS)***********		
-203	211-0005-00			1	.SCREW,MACHINE:4-40 X 0.125 INCH,PNH STL	83385	ORD BY DESCR
-204	210-0004-00			1	.WASHER,LOCK:#4 INTL,0.015 THK,STL CD PL	000BK	ORD BY DESCR
-205	214-2569-00			1	.HEAT SINK,XSTR:(1) TO-5,BE-CU	80009	214-2569-00
					.**********(END ATTACHING PARTS)*********		

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
2-206	214-0817-00			1	.HEAT SINK,XSTR:	14566	A11193-T05
-207	386-1635-00	B010120		1	.SUPPORT,CKT BD:CHASSIS MT,ACETAL	80009	386-1635-00
-208	131-1771-00			2	.CONNECTOR,RCPT,:CIRCUIT CARD,6 FEMALE	22526	65001-111
-209	----- -----			1	CKT BOARD ASSY:I.F. MIXER(SEE A22 REPL)		
-210	131-1771-00			2	.CONNECTOR,RCPT,:CIRCUIT CARD,6 FEMALE	22526	65001-111
-211	337-1417-00			2	.SHIELD,ELEC:0.55 SQ X 0.685 INCH HIGH	80009	337-1417-00
-212	131-0993-00	B000100	B010644	1	.BUS,CONDUCTOR:2 WIRE BLACK	00779	850100-01
	131-0993-00	B010645		2	.BUS,CONDUCTOR:2 WIRE BLACK	00779	850100-01
-213	131-0589-00	B000100	B010644	4	.TERMINAL,PIN:0.46 L X 0.025 SQ	22526	48283-029
	131-0608-00	B010645		7	.TERMINAL,PIN:0.365 L X 0.025 PH BRZ GOLD	22526	47357
-214	214-0817-00			2	.HEAT SINK,XSTR:	14566	A11193-T05
	337-2535-00	B010209		IN	.SHIELD BSK,ELEK:BERYLLIUM COPPER	30817	97-555 CD-X
-215	----- -----			1	CKT BOARD ASSY:I.F. ATTEN/AUD		
	----- -----			-	(SEE A23 REPL)		
-216	136-0220-00			2	.SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT,PCB M	71785	133-23-11-034
-217	131-1771-00			2	.CONNECTOR,RCPT,:CIRCUIT CARD,6 FEMALE	22526	65001-111
-218	337-1417-00			4	.SHIELD,ELEC:0.55 SQ X 0.685 INCH HIGH	80009	337-1417-00
-219	131-0589-00			8	.TERMINAL,PIN:0.46 L X 0.025 SQ	22526	48283-029
	337-2459-00			1	.SHIELD,ELEC:CKT CARD	80009	337-2459-00
	337-2535-00			AR	.SHIELD BSK,ELEK:BERYLLIUM COPPER	30817	97-555 CD-X
	337-2601-00	B000100	B010647	1	.SHIELD,ELEC:CIRCUIT BOARD	80009	337-2601-00
	337-2601-01	B010648		1	SHIELD,ELEC:CIRCUIT BOARD	80009	337-2601-01
-220	----- -----			1	CKT BD ASSY:I.F.S.W.F. PREAMP		
	----- -----			-	(SEE A24 REPL)		
-221	343-0730-00			1	.CLAMP,FILTER:ALUMINUM	80009	343-0730-00
					.*************(ATTACHING PARTS)***********		
-222	211-0081-00	B000100	B000119	4	.SCREW,MACHINE:2-56 X 0.562,PNH STL	83385	ORD BY DESCR
	211-0034-00	B010120		4	.SCREW,MACHINE:2-56 X 0.50 INCH,PNH	83385	ORD BY DESCR
-223	210-0850-00	B000100	B000119	4	.WASHER,FLAT:0.093 ID X 0.281 INCH OD	12327	ORD BY DESCR
	210-0001-00	B010120		4	.WASHER,LOCK:#2 INTL,0.013 X 0.18 OD,STL	78189	1202-00-00-0541C
					.***********(END ATTACHING PARTS)*********		
-224	337-2540-00			1	.SHLD GSKT,ELEK:2.25 X 0.375 X0.062	80009	337-2540-00
-225	337-2458-00			1	.SHIELD,ELEC:CIRCUIT CARD	80009	337-2458-00
-226	136-0333-00	B000100	B000119	8	.SOCKET,PIN TERM:U/W 0.03 DIA PINS	00779	1-331677-4
	136-0333-00	B010120		10	.SOCKET,PIN TERM:U/W 0.03 DIA PINS	00779	1-331677-4
-227	131-1771-00			2	.CONNECTOR,RCPT,:CIRCUIT CARD,6 FEMALE	22526	65001-111
-228	337-2535-00			IN	.SHIELD BSK,ELEK:BERYLLIUM COPPER	30817	97-555 CD-X
-229	337-2459-00			1	.SHIELD,ELEC:CKT CARD	80009	337-2459-00
-230	337-2578-00	B010120		1	.SHIELD,ELEC:CIRCUIT BOARD	80009	337-2578-00
-231	214-2746-00			1	.HEAT SINK,XSTR:(1)TO-39,ALUMINUM	80009	214-2746-00
					.*************(ATTACHING PARTS)***********		
-232	211-0005-00			1	.SCREW,MACHINE:4-40 X 0.125 INCH,PNH STL	83385	ORD BY DESCR
-233	210-0004-00			1	.WASHER,LOCK:#4 INTL,0.015 THK,STL CD PL	000BK	ORD BY DESCR
-234	214-2569-00			1	.HEAT SINK,XSTR:(1) TO-5,BE-CU	80009	214-2569-00
					.***********(END ATTACHING PARTS)*********		
-235	214-0817-00			1	.HEAT SINK,XSTR:	14566	A11193-T05
-236	----- -----			1	CKT BD ASSY:I.F.S.W.F. PREAMP		
	----- -----			-	(SEE A25 REPL)		
-237	343-0730-00			1	.CLAMP,FILTER:ALUMINUM	80009	343-0730-00
					.*************(ATTACHING PARTS)***********		
-238	211-0081-00	B000100	B000119	4	.SCREW,MACHINE:2-56 X 0.562,PNH STL	83385	ORD BY DESCR
	211-0034-00	B010120		4	.SCREW,MACHINE:2-56 X 0.50 INCH,PNH	83385	ORD BY DESCR
-239	210-0850-00	B000100	B000119	4	.WASHER,FLAT:0.093 ID X 0.281 INCH OD	12327	ORD BY DESCR
	210-0001-00	B010120		4	.WASHER,LOCK:#2 INTL,0.013 X 0.18 OD,STL	78189	1202-00-00-0541C
					.***********(END ATTACHING PARTS)*********		
-240	337-2540-00			1	.SHLD GSKT,ELEK:2.25 X 0.375 X0.062	80009	337-2540-00
-241	337-2458-00			1	.SHIELD,ELEC:CIRCUIT CARD	80009	337-2458-00
-242	136-0333-00	B000100	B000119	8	.SOCKET,PIN TERM:U/W 0.03 DIA PINS	00779	1-331677-4
	136-0333-00	B010120		10	.SOCKET,PIN TERM:U/W 0.03 DIA PINS	00779	1-331677-4
-243	131-1771-00			2	.CONNECTOR,RCPT,:CIRCUIT CARD,6 FEMALE	22526	65001-111
-244	337-2535-00			IN	.SHIELD BSK,ELEK:BERYLLIUM COPPER	30817	97-555 CD-X
-245	337-2459-00			1	.SHIELD,ELEC:CKT CARD	80009	337-2459-00

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
2-246	337-2578-00	B010120		1	.SHIELD,ELEC:CIRCUIT BOARD	80009	337-2578-00
-247	214-2746-00			1	.HEAT SINK,XSTR:(1)TO-39,ALUMINUM	80009	214-2746-00
					.************(ATTACHING PARTS)***********		
-248	211-0005-00			1	.SCREW,MACHINE:4-40 X 0.125 INCH,PNH STL	83385	ORD BY DESCR
-249	210-0004-00			1	.WASHER,LOCK:#4 INTL,0.015 THK,STL CD PL	000BK	ORD BY DESCR
-250	214-2569-00			1	.HEAT SINK,XSTR:(1) TO-5,BE-CU	80009	214-2569-00
					.**********(END ATTACHING PARTS)*********		
-251	214-0817-00			1	.HEAT SINK,XSTR:	14566	A11193-T05
-252	----- -----			1	CKT BOARD ASSY:I.F.S.W.F. POSTAMP		
	----- -----			-	(SEE A26 REPL)		
-253	136-0220-00	B000100	B000101	3	.SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT,PCB M	71785	133-23-11-034
-254	131-1771-00			2	.CONNECTOR.RCPT,:CIRCUIT CARD,6 FEMALE	22526	65001-111
-255	214-2746-00			1	.HEAT SINK,XSTR:(1)TO-39,ALUMINUM	80009	214-2746-00
					.************(ATTACHING PARTS)***********		
-256	211-0005-00			1	.SCREW,MACHINE:4-40 X 0.125 INCH,PNH STL	83385	ORD BY DESCR
-257	210-0004-00			1	.WASHER,LOCK:#4 INTL,0.015 THK,STL CD PL	000BK	ORD BY DESCR
-258	214-2569-00			1	.HEAT SINK.XSTR:(1) TO-5,BE-CU	80009	214-2569-00
					.**********(END ATTACHING PARTS)*********		
-259	214-0817-00			1	.HEAT SINK,XSTR:	14566	A11193-T05
-260	----- -----			1	CKT BD ASSY:I.F. ZERO CARRIER		
	----- -----			-	(SEE A27 REPL)		
-261	136-0220-00	B000100	B000119	1	.SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT,PCB M	71785	133-23-11-034
-262	131-1771-00			2	.CONNECTOR,RCPT,:CIRCUIT CARD,6 FEMALE	22526	65001-111
-263	337-1417-00			5	.SHIELD,ELEC:0.55 SQ X 0.685 INCH HIGH	80009	337-1417-00
-264	----- -----			2	CKT BD ASSY:DET-VIDEO AMP		
	----- -----			-	(SEE A28,A29 REPL)		
	----- -----			-	.EACH CIRCUIT BOARD ASSY INCLUDES:		
-265	136-0241-00			1	.SKT,PL-IN ELEK:MICROCIRCUIT,10 CONT,PCB M	71785	133-99-12-064
-266	337-1417-00			3	.SHIELD,ELEC:0.55 SQ X 0.685 INCH HIGH	80009	337-1417-00
-267	131-1771-00			2	.CONNECTOR,RCPT,:CIRCUIT CARD,6 FEMALE	22526	65001-111
-268	131-0993-00			1	.BUS,CONDUCTOR:2 WIRE BLACK	00779	850100-01
-269	131-0589-00			3	.TERMINAL,PIN:0.46 L X 0.025 SQ	22526	48283-029
-270	214-0973-00			3	.HEAT SINK,ELEC:0.28 X 0.18 OVAL X 0.187"H	80009	214-0973-00
-271	136-0235-00			3	.SOCKET,PLUG-IN:6 CONTACT,ROUND	71785	133-96-12-062
-272	136-0220-00			1	.SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT,PCB M	71785	133-23-11-034
-273	214-2746-00			1	.HEAT SINK,XSTR:(1)TO-39,ALUMINUM	80009	214-2746-00
					.************(ATTACHING PARTS)***********		
-274	211-0005-00			1	.SCREW,MACHINE:4-40 X 0.125 INCH,PNH STL	83385	ORD BY DESCR
-275	210-0004-00			1	.WASHER,LOCK:#4 INTL,0.015 THK,STL CD PL	000BK	ORD BY DESCR
-276	214-2569-00			1	.HEAT SINK,XSTR:(1) TO-5,BE-CU	80009	214-2569-00
					.**********(END ATTACHING PARTS)*********		
-277	214-0817-00			1	.HEAT SINK,XSTR:	14566	A11193-T05
-278	----- -----			1	CKT BOARD ASSY:I.F. INTERFACE		
	----- -----			-	(SEE A32 REPL)		
					*************(ATTACHING PARTS)***********		
-279	211-0116-00			4	SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH BRS	83385	ORD BY DESCR
-280	211-0121-00			8	SCR,ASSEM WSHR:4-40 X 0.438 INCH,PNH BRS	83385	ORD BY DESCR
					***********(END ATTACHING PARTS)*********		
	----- -----			-	CKT BOARD ASSY INCLUDES:		
-281	136-0252-07			15	.SOCKET,PIN CONN:W/O DIMPLE	22526	75060-012
-282	131-0589-00	B000100	B010213	15	.TERMINAL,PIN:0.46 L X 0.025 SQ	22526	48283-029
	131-0589-00	B010214	B010559	14	.TERMINAL,PIN:0.46 L X 0.025 SQ	22526	48283-029
	131-0589-00	B010560		6	.TERMINAL,PIN:0.46 L X 0.025 SQ	22526	48283-029
	131-0160-00	B010560		8	.CONTACT,ELEC:CKT BD,1 CONTACT		
-283	131-0787-00			123	.CONTACT,ELEC:0.64 INCH LONG	22526	47359
-284	131-1003-00			12	.CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
-285	380-0502-00	B000100	B010649	10	HOUSING,CKT BD:5.775 L X 2.13 W.AL	80009	380-0502-00
	380-0502-01	B010650		10	HOUSING,CKT BD:5.775 L X 2.13 W.AL	80009	380-0502-01
					*************(ATTACHING PARTS)***********		
-286	213-0774-00	B000100	B010649	80	SCREW,TPG,TF:M3-0.5 X 10 MM L,PNH,TAPTIT	93907	ORD BY DESCR
	211-0294-00	B010650		80	SCREW,MACHINE:M3 X 0.5 X 10MM,PNH	93907	ORD BY DESCR
					***********(END ATTACHING PARTS)*********		
-287	386-3803-00			1	STIF,CKT CD:2.95 L,ALUMINUM	80009	386-3803-00

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
2-288	386-3804-00			1	STIF,CKT BD:9.1 L,ALUMINUM	80009	386-3804-00
-289	386-3725-00			1	STIF,CKT CD:12.65 L,AL	80009	386-2725-00
-290	342-0202-00			3	INSULATOR,PLATE:TRANSISTOR	01295	10-21-023-106
-291	----- -----			2	CKT BOARD ASSY:PIN DRIVER		
	----- -----			-	(SEE A30,A31 REPL)		
					**************(ATTACHING PARTS)***********		
-292	211-0116-00			8	SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH BRS	83385	ORD BY DESCR
					************(END ATTACHING PARTS)*********		
	----- -----			-	EACH CKT BOARD ASSY INCLUDES:		
-293	136-0260-02	B000100	B010644	3	.SKT,PL-IN ELEK:MICROCIRCUIT,16 DIP,LOW CL	09922	DILB16P-108T
	136-0729-00	B010645		3	.SKT,PL-IN ELEK:MICROCKT,16 CONTACT	09922	DILB16P-108T
-294	131-0589-00			5	.TERMINAL,PIN:0.46 L X 0.025 SQ	22526	48283-029
-295	136-0263-04			10	.SOCKET,PIN TERM:FOR 0.025 INCH SQ PIN	22526	75377-001
-296	198-3693-00			1	WIRE SET,ELEC:	80009	198-3693-00
-297	131-0707-00			6	.CONNECTOR,TERM:22-26 AWG,BRS & CU BE GOLD	22526	47439
-298	131-0621-00			58	.CONNECTOR,TERM:22-26 AWG,BRS & CU BE GOLD	22526	46231
-299	352-0198-00			5	.HLDR,TERM CONN:2 WIRE BLACK	80009	352-0198-00
-300	352-0169-00			3	.HLDR,TERM CONN:2 WIRE BLACK	80009	352-0169-00
-301	352-0199-00			5	.CONN BODY,PL,EL:3 WIRE BLACK	80009	352-0199-00
-302	352-0197-00			1	.CONN BODY,PL,EL:1 WIRE BLACK	80009	352-0197-00
-303	352-0200-00			2	.HLDR,TERM CONN:4 WIRE BLACK	80009	352-0200-00
-304	352-0201-00			1	.CONN BODY,PL,EL:5 WIRE BLACK	80009	352-0201-00
-305	352-0205-00			2	.CONN BODY,PL,EL:9 WIRE BLACK	80009	352-0205-00
-306	175-0832-00			FT	.WIRE,ELECTRICAL:9 WIRE RIBBON	08261	SS-0926(1061)0C
-307	175-0828-00			FT	.WIRE,ELECTRICAL:5 WIRE RIBBON	08261	SS-0526-710610C
-308	175-0826-00			FT	.WIRE,ELECTRICAL:3 WIRE RIBBON	80009	175-0826-00
-309	175-0825-00			FT	.WIRE,ELECTRICAL:2 WIRE RIBBON	80009	175-0825-00
-310	179-2570-00			1	WIRING HARNESS,:MAIN	80009	179-2570-00
	343-0549-00			66	.STRAP,TIEDOWN:0.091 W X 3.62 INCH LONG	06383	PLT1M
	131-0621-00			108	.CONNECTOR,TERM:22-26 AWG,BRS & CU BE GOLD	22526	46231
	131-0622-00			8	.CONTACT,ELEC:0.577"L,28-32 AWG WIRE	22526	46241
	131-0707-00			10	.CONNECTOR,TERM:22-26 AWG,BRS & CU BE GOLD	22526	47439
	131-0792-00			8	.CONNECTOR,TERM:18-20 AWG,CU BE GOLD PL	22526	46221
	210-0287-00			4	.TERMINAL,LUG:# 6 RING	00779	34142
-311	352-0161-00			2	.HLDR,TERM CONN:3 WIRE,BLACK	80009	352-0161-00
-312	352-0166-00			1	.HLDR,TERM CONN:8WIRE,BLACK 0.1 SPACING	80009	352-0166-00
	352-0169-00			1	.HLDR,TERM CONN:2 WIRE BLACK	80009	352-0169-00
	352-0198-00			5	.HLDR,TERM CONN:2 WIRE BLACK	80009	352-0198-00
	352-0199-00			2	.CONN BODY,PL,EL:3 WIRE BLACK	80009	352-0199-00
	352-0200-00			3	.HLDR,TERM CONN:4 WIRE BLACK	80009	352-0200-00
	352-0201-00			9	.CONN BODY,PL,EL:5 WIRE BLACK	80009	352-0201-00
-313	352-0202-00			1	.HLDR,TERM CONN:6 WIRE BLACK	80009	352-0202-00
-314	352-0203-00			7	.HLDR,TERM CONN:7 WIRE BLACK	80009	352-0203-00
	352-0205-00			1	.CONN BODY,PL,EL:9 WIRE BLACK	80009	352-0205-00

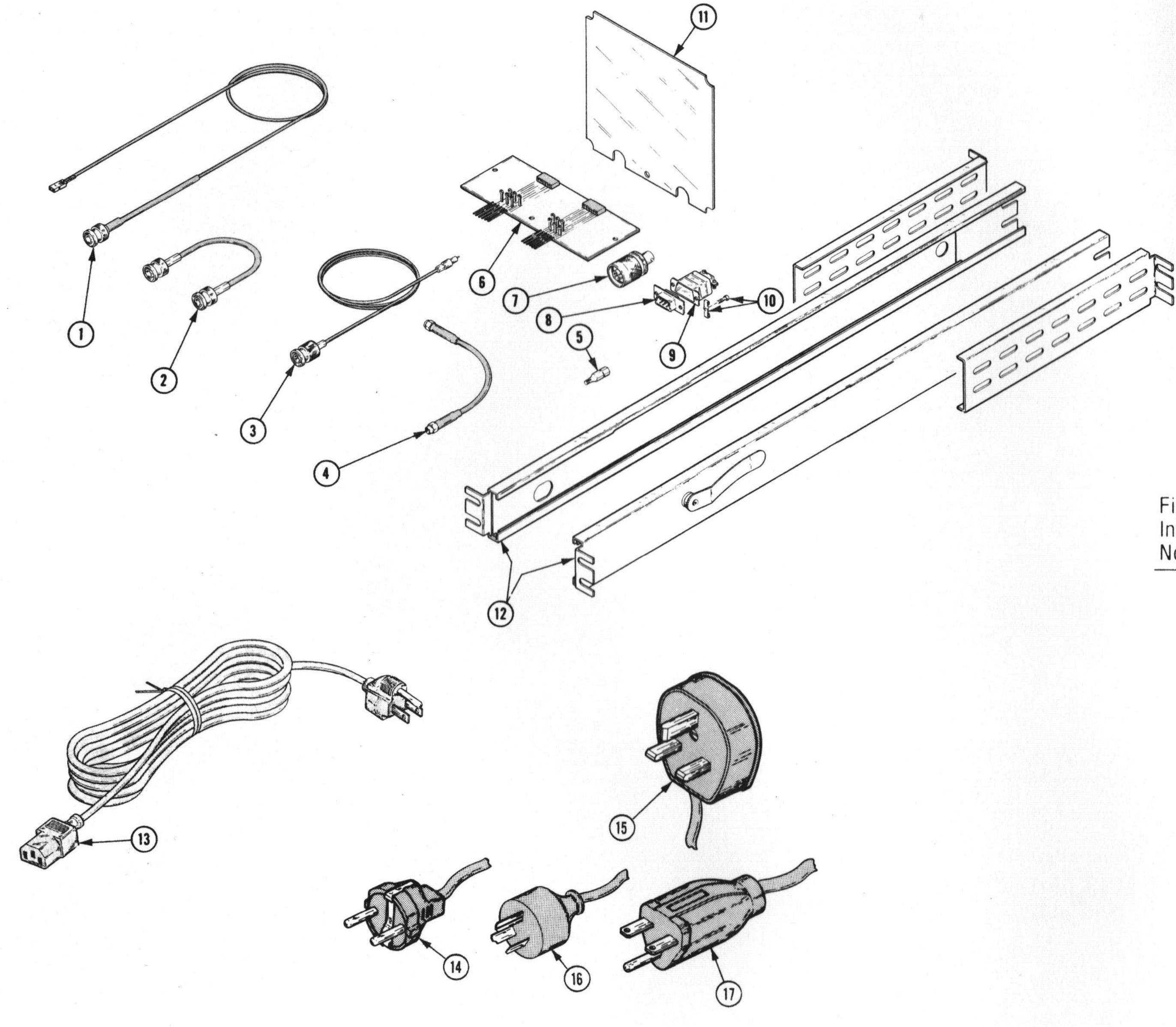


Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
-1	175-2140-00			1	CABLE ASSY,RF:50 OHM COAX,30.0L	80009	175-2140-00
-2	012-0751-00			1	CABLE,INTERCON:7.375 L	80009	012-0751-00
-3	067-0709-00			1	FIXTURE,CAL:30.0 L,CABLE ASSY	80009	067-0709-00
-4	012-0752-00			1	CABLE,INTERCON:7.5 L	80009	012-0752-00
-5	003-0816-00			1	BIT,SCREWDRIVER:W/TORX T10 TIP	000CB	38-217-2
-6	670-5034-00			1	CIRCUIT BD ASSY:EXTENDER	80009	670-5034-00
-7	103-0045-00			1	ADAPTER,CONN:BNC FEMALE TO N MALE	91836	KN99-35
-8	131-1007-00			1	CONNECTOR,RCPT,:9 CONTACT,MALE	71785	231-09-11-101
-9	200-1170-00			1	SHLD,ELEC CONN:9 CONTACT,STLCD PL	71468	DE-24657
-10	213-0260-00			2	SCREW-LOCK ASSY:4-40 FILM W/STL CLIP	71468	D 20419-16
-11	331-0393-12	XB010120		1	SCALE,CRT:EXT,NTSC,PHASE,PHOTO,CLEAR	80009	331-0393-12
-12	351-0487-00	B000100	B010198	1	SLIDE,DWR,EXT:STATIONARY AND INTERMEDIATE	80009	351-0487-00
	351-0301-01	B010199		1	SLIDE,DWR,EXT:W/HOLE	06666	OBD
-13	161-0066-00			1	CABLE ASSY,PWR,:3,18 AWG,115V,98.0 L	16428	KH8481
-14	161-0066-09	XB010648		1	CABLE ASSY,PWR:3,0.75MM SQ,220V,96.0 L	80126	OBD
	-----	-----		-	(A1 EUROPEAN ONLY)		
-15	161-0066-10	XB010648		1	CABLE ASSY,PWR:3,0.75MM SQ,240V,96.0 L	80126	OBD
	-----	-----		-	(A2 UNITED KINGDOM ONLY)		
-16	161-0066-11	XB010648		1	CABLE ASSY,PWR:3,0.75MM,240V,96.0L	S3109	OBD
	-----	-----		-	(A3 AUSTRALIAN ONLY)		
-17	161-0066-12	XB010648		1	CABLE ASSY,PWR:3,18 AWG,240V,96.0 L	80126	OBD
	-----	-----		-	(A4 NORTH AMERICAN ONLY)		
	070-2200-01			1	MANUAL,TECH:INSTRUCTION	80009	070-2200-01
	015-0352-00	XB010360		1	ACCESSORY ASSY:250KHZ,LOW PASS FILTER	80009	015-0352-00

Tektronix

COMMITTED TO EXCELLENCE

MANUAL CHANGE INFORMATION

Date: August 19th, 1982 Change Reference: C7/882

Product: 1450-1 TELEVISION DEMODULATOR Manual Part No.: 070-2200-01

DESCRIPTION

REPLACEABLE ELECTRICAL PARTS LIST

PAGE 7-3
CHANGE TO:

A30	-----	-----	CKT BOARD ASSY: PIN DRIVER/IF ATTEN AMP
	-----	-----	AVAILABLE UNDER 672-0638-00. OPTION 3 ONLY)
A30	-----	-----	CKT BOARD ASSY: PIN DRIVER/IF ATTEN AMP
	-----	-----	AVAILABLE UNDER 672-0638-01. OPTION 1 & 2 ONLY)
A31	-----	-----	CKT BOARD ASSY: PIN DRIVER/IF ATTEN/MIXER/FILTER
	-----	-----	AVAILABLE UNDER 672-0639-00. OPTION 3 ONLY)
A31	-----	-----	CKT BOARD ASSY: PIN DRIVER/IF ATTEN/MIXER/FILTER
	-----	-----	AVAILABLE UNDER 672-0639-01. OPTION 1 & 2 ONLY)

Tektronix®
COMMITTED TO EXCELLENCE

MANUAL CHANGE INFORMATION

Date: 2-11-81 Change Reference: C100/281

Product: GENERAL Manual Part No.: GENERAL

DESCRIPTION

WARNING

During rackmount installation, interchanging the left and right slide-out track assemblies defeats the extension stop (safety latch) feature of the tracks. Equipment could, when extended, come out of the slides and fall from the rack, possibly causing personal injury and equipment damage.

When mounting the supplied slide-out tracks, inspect both assemblies to find the LH (left hand) and RH (right hand) designations to determine correct placement. Install the LH assembly to your left side as you face the front of the rack and install the RH assembly to your right side. Refer to the rackmounting instructions in this manual for complete information.